THE

AMERICAN GAS-LIGHT JOURNAL

DEVOTED TO

LIGHT, WATER, AND SEWERAGE.

JOHN B. MURRAY, BANKER, NEW-YORK CITY, PROPRIETOR.

Iron Buildings, No. 254 Canal Street, East, (cor. Elm Street,) near Broadway.

FIRST YEAR.—No. 10. NEW-YORK, MONDAY, APRIL 2, 1860. $3 PER ANNUM.

TO GAS-FITTERS AND PLUMBERS.

L. WAEFELER & CO., No. 94 BEEKMAN STREET, New York, have always on hand several hundred kegs WROUGHT-IRON GAS-PIPE HOOKS, of all sizes from ¼ to 2 inches. They are made of best quality horse-shoe nail iron, and warranted not to break.

Also, PLUMBERS' MATERIALS, such as China Wash-Basins, Closet-Basins, Pan-Closets, Bath Tubs, Boilers, Brass and Silver-plated Cocks, Brass and Iron Pumps, Hydraulic Rams, French Fountain Jets, &c., all at the very lowest prices.

Butts & Kendall,

(FORMERLY F. BUTTS & CO.,)

Dealers in

STERLING COAL,

Cleveland, Ohio.

The attention of Gas Companies is called to the following letters as to the merits of the above Coal, being a few of the many we have received, and from which we are led to believe that there is no English or American Coal which combines all the qualities desired in a Gas Coal as perfectly as the Sterling:—

Office of the Manhattan Gas Light Co.,
Irving Place, corner East 15th Street,
New York, January 13, 1860.

MESSRS. BUTTS & KENDALL:—*Gentlemen*:—Yours of 9th inst. is received. The "Sterling Coal" received from you during the past year worked very satisfactorily—averaging 9520 cubic feet of 15 candle Gas per ton of 2240 lbs, and 41 bushels of Coke, weighing 1465 lbs.

We consider it among the best of American Gas Coals, for the quantity and quality of the Gas produced, and also for the excellent quality of its Coke. I am, Gentlemen, your obedient servant,

CHARLES ROOME, President.

Office of the Rondout and Kingston Gas Light Co.,
Rondout, January 4, 1860.

MESSRS. BUTTS & KENDALL:—*Gentlemen*:—The 600 tons of Sterling Coal ordered from you in August, 1859, has now been in use over four months, to my entire satisfaction. Its average yield is 4, 40-100 feet, and a good strong light. The Coke produced equal in quality and quantity, to best English Caking Coals. It burns very freely with little clinker. In purification it is economical, using no more lime than New Pelton. It is superior to any American Coal I ever used. I shall be pleased to give you any further information at my office in New York. WM. W. HAGUE, 522 Broadway

The Cleveland Gas Light and Coke Co.,
Office, 195 Superior Street,
Cleveland, December 30, 1859.

MESSRS. BUTTS & KENDALL:—*Gentlemen*:—This Company has used between 3000 and 4000 tons of your "Sterling Coal," and are still using it with very satisfactory results. We find the average product of a ton of 2000 lbs. is about 8800 feet of Gas and about 37 bushels of Coke. The Gas is of good illuminating power and quite free from sulphur or other impurities, one bushel of lime purifying 9000 feet, and the Coke of very superior quality. The yield of Gas is about the same as from the Pittsburgh Coal, and the Coke better adapted to our use. Yours, truly, T. DWIGHT ELLS, Sec.

Office of the Sandusky Gas Co.,
Sandusky, Jan. 16, 1860.

MESSRS. BUTTS & KENDALL:—*Gentlemen:*—This Company has used your Sterling Coal since July 3d, 1859, and are still continuing the use of it with satisfaction to the Company and consumers. The average product has been 8,629 feet of Gas per ton of 2,000 lbs, and 37 bushels of Coke of very superior quality. The Gas is as good as that obtained from Pittsburgh Coal. I consider it the best Coal ever used in our works. I am, gentlemen, yours respectfully,

WM HUDSON, Sup't and Sec'y.

We would also refer to Gas Companies in the following places:—New York City (Manhattan and New York Co.'s), Albany, Troy, West Troy, Rochester, Oswego, Rondout, Kingston, Albion, Brockport, Seneca Falls, Elmira and Lyons, in the State of New York; Cleveland, Toledo, Sandusky, Norwalk and Oberlin, in Ohio; Detroit, Ann Arbor, Grand Rapids and Kalamazoo, in Michigan; Coburg, in Canada, and two Companies in Milwaukie, Wisconsin.

The extensive Mines of the Sterling Coal and Mining Company, in the western part of Pennsylvania (known as the Sterling Hills, and the highest in that part of the State), are wholly under our control, and the Coal is mined and sold only by us or our Agents. The average product of the Sterling Coal, per ton of 2,000 lbs., is 8,733 feet of 15¼ candle Gas (4, 37-100 per lb.), and 37 bushels of Coke of very superior quality. Getting our Coal to this place by railroad, a supply can be had during the summer months (as well as at all other times), which is not the case with coals dependent upon high water for transportation, as are most or all other gas coals which are sent to the Lake ports for shipment. Our mining facilities are such, that we are prepared to ship extensively. For any further information address the undersigned, or M. BALLARD, Esq., Syracuse, N. Y., who is our Agent for that State.

BUTTS & KENDALL, Cleveland, Ohio.

CORNELIUS & BAKER,

MANUFACTURERS OF

LAMPS, CHANDELIERS,

GAS-FIXTURES, &c.

MANUFACTORIES,

821 CHERRY STREET,

AND

FIFTH STREET AND COLUMBIA AVENUE.

STORE, 710 CHESNUT STREET,

PHILADELPHIA.

LAND IN CANADA FOR GAS-LIGHT SHARES.

Town of Coburg,	Northumberland Co	.....	14 acres.
Do Hamilton,	do	do	100 "
Do North Monaghan,	Peterborough	do	600 "
Do South do	do	do	100 "
Do Dummer,	do	do	100 "
Do Douro,	do	do	223 "
Do Haldimond.	Northumberland	do	200 "

These lands are well located, and will be exchanged on equitable terms for sound, dividend paying gas-light shares in the United States or British Provinces.

Apply or address E. R. L., Post-Office, Toronto, Canada, or at Rooms of AMERICAN GAS-LIGHT JOURNAL, New York.

CLAY RETORTS.

J. K. BRICK & CO.

BROOKLYN CLAY RETORT AND FIRE-BRICK Works, Van Dyke, near Van Brunt street, Brooklyn, N. Y.—J. K. BRICK & CO., manufacturers of Non-Filtrating Clay Retorts, Fire Brick, Gas and Hot House Tiles, Arch, Furnace and Cupola Brick, Fire Cement, Mortar, &c.

J. K. B. & Co., have, at their extensive works, facilities for manufacturing, which enable them to supply gas companies and others with any amount of their goods, at short notice.

Particular attention is invited to their superior Clay-Retorts, which are giving perfect and universal satisfaction to the numerous gas companies who have them in practical operation.

They refer parties interested to the Brooklyn, N. Y., Gas-Light Works, where can be seen more than two hundred in daily use.

To Messrs. BOUSQUET, CHAMPENOIS & Co., Clay Retort Manufacturers.

I await your reply to my letter of the 6th instant, since which I have set in action a bench of seven retorts, according to your instructions, and the success has been complete. Your Retorts have not the smallest crack or fissure, although in contact with the fuel. I am all the more satisfied and surprised at this, inasmuch as of all my old Retorts, both Belgian and English, not one has been able to resist the first kindling of the fuel without cracking.

Indeed, the English Retorts fall in pieces, notwithstanding all the imaginable care, and lately they have done this, even when heated up according to your instructions.

Allow me to congratulate you on having solved the most difficult problem, and on your success in rendering Clay Retorts of real value in Gas-Works. Respectfully yours,

AUG. REBUFFET,
Director of the Genoa Gas-Light Co.

Genoa, 11th November, 1857.

We can add nothing to this letter except the fact that we fully endorse the certificate given above to Messrs. Champenois & Co., as far as regards the whole of the Retorts in use in our works and in those of our friends.—*Journal de l'Eclairage au Gaz.*

Trieste, April 25th, 1857.

To Mr. CHAMPENOIS:—I employ some of your Retorts, and cannot but express my satisfaction. *I prefer them of all those I have tried.* Therefore neglecting not all the advantages resulting from the use of the same, send me a plan or drawing of a bench of seven Retorts, according to the instructions of *Le Journal de l'Eclairage au Gaz.* Address to Mr. E. Vermarre, Marseilles, who will soon send me some more of your retorts. Respectfully yours,

ALFRED GOITEROUE,
Engr. of Trieste Gas Works, Dalmatia, Austria.

The Clay Retort Works of J. K. Brick & Co. having been organized under my superintendence, the certificate above may be applied as well to the Clay Retorts manufactured in Brooklyn; they being in operation at the Brooklyn, Harlem, Syracuse, Hempstead, and many other Gas-Works, where the result is identically the same. In Brooklyn they are set without any tiles, therefore are in direct contact with the fuel.

Brooklyn, N. Y., February 21st, 1860.
(Signed,) H. CHAMPENOIS.

MARSH'S PATENT ROSIN OR SUN-LIGHT GAS-Works, for Private Dwellings, Hotels, Factories, Railway stations, Sugar-Houses, Towns, &c. By the peculiar construction of the Retorts, the largest amount of decomposing surface is obtained in the smallest space. 2d. Gas is manufactured from crude rosin, without the least deposit of carbonaceous matter in the retorts or pipes: thus enabling them to be operated continuously, generating rapidly the best and cheapest illuminating gas obtained from this material. ALFRED MARSH & CO.,
241 Broadway, New York.

JOHN HEARN & CO.,

DEALERS AND MINERS IN

AMERICAN GAS-COALS.

ERIE., PENN.,

Would call the attention of Gas Companies to the superior quality of our Coals.

For the past ten years they have been used by a majority of the Gas Companies in the State of New York, west of Albany and Troy. And also, by the Gas Companies in the cities and towns of the North-Western States, and, during the past year, by the East Troy Gas-Light Company, Albany Gas-Light Co., and Manhattan Gas-Light Co. of the city of New-York,—all of which heretofore used English Coals.

Owning our mines and a fleet of vessels on the Lakes, having no Railroad transportation, and only 70 miles of canal from this city, or 140 miles of canal and Lake from Buffalo to the coal fields, being 175 miles less of transportation for Coal to the Seaboard, than any Coal Depot on the Lakes, and having an Agency in Buffalo for the transhipment of our Coals only, it is unnecessary to say that parties purchasing of us, will get their Coal at first hand, saving, thereby, commission to managers, and 175 miles of extra Railroad and Lake transportation.

A working average of our Beaver Coal is 9,500 feet of 16 Candle Gas, and 40 bushels Coal to the ton of 2,240 lbs.

The Manhattan Gas-Light Co of New York having thoroughly tested the Gas Coals of Pennsylvania and Ohio, the following extract from a letter to us will speak for itself:

"MANHATTAN GAS-LIGHT COMPANY,
"New York, June 15th, 1859.

"Messrs. JOHN HEARN & Co.,
Erie, Penn.:

"GENTLEMEN,—This Company has a contract with your firm for the delivery of five thousand tons of Gas Coal, half each Beaver and Mount Carbon, at $ —— per ton of 2,240 lbs.

"The cargo which has been received is satisfactory, and as we shall need 15 or 20 thousand tons more, to be delivered through the present summer, we beg you to advise us whether you desire to increase your contract. We have applications from various parties who desire to supply the Company, but shall be satisfied to get a larger quantity of your Coals, provided you can serve us on terms equally favorable with others.

"For the Gas Co.,
"HENRY YOUNG."

We are prepared to contract for the delivery of our Coals in the City of New York, or the cities and towns on the Hudson River.

BUTLER'S PATENT PORTABLE GAS-WORKS are designed for Dwellings, Churches, Factories and Country Villages, as well as for large consumers in cities. They make gas from CRUDE ROSIN, and are WARRANTED to make as rich an article, at less than ONE-HALF the cost of that made by the old method in Portable Gas-Works, and at one-third the average price of Coal Gas as sold in cities. Great savings in expense of light GUARANTEED to large consumers.

Works of all sizes furnished to suit applicants. Mains, Service and Distributing Pipes put in. Also, a large assortment of Gas-Chandeliers, and other fixtures, always on hand, at the lowest prices.

The MANSION HOUSE, BROOKLYN, with 250 burners in constant use, make their own gas with my apparatus, with results as stated above. This, (with a small one at my store,) can be seen in operation by application at my office, where descriptive pamphlets, with the names of numbers who are using them, will be furnished.

JOHN BUTLER,
Nos. 112 Fulton and 15 Henry street, Brooklyn, N. Y.

FELLOWS, HOFFMAN & CO.,

(Late STARR, FELLOWS & CO.,)

MANUFACTURERS OF GAS-FIXTURES AND Chandeliers, Solar, Camphene and Fluid Lamps Girandoles, Hall Lanterns, &c., No 74 Beekman st., New York.

W. ANDERSON,

MANUFACTURER OF GAS-BURNERS, NEW HAven Railroad Depot, cor. of Franklin and Elm sts., New York. Scotch Tips constantly on hand. Tips and Burners made to order. Brass Tips for street lights and other purposes made to order.

J. H. BRUNDAGE & CO.,

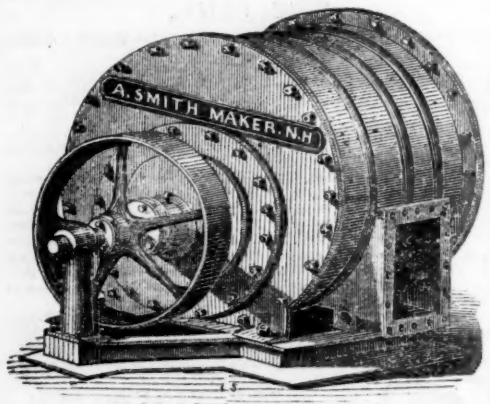
38 BURLING SLIP, NEW YORK, DEALERS IN

ROSINS ADAPTED ESPECIALLY TO GASMAKERS' USE.

N. B.—J. H. B. & CO. ARE CONSTANTLY PURCHASERS OF ROSIN-GAS TAR.

Office for the Inspection of Gas Meters,
FOR THE STATE OF NEW YORK.

AGENT FOR
Scammon's Celebrated Gas Apparatus,
FOR EITHER COAL OR ROSIN GAS.
GAS-FIXTURES OF ALL DESCRIPTIONS.
GAS-FITTING.
GEORGE H. KITCHEN & CO.,
561 BROADWAY, NEW YORK.



THE ABOVE CUT REPRESENTS MACKENZIE'S PATENT GAS EXHAUSTER (Force Blast.)

It is offered to Gas Companies as a most perfect Machine. They are made of various sizes, capable of exhausting from 5,000 to 150,000 cubic feet per hour.

They require less power, work smoothly, are not so liable to get out of order, and cost much less than the imported ones.

Gas companies intending to use an exhauster, by stating the quantity of gas they may wish to have pass through per hour, will be furnished with a statement of the proper size, and the price of the same, on application to ADDISON SMITH, Manufacturer, New Haven, Conn., or to Messrs. ELLIMAN BROTHERS, New York.

The manufacturer has the liberty to refer to the Albany, N. Y., Gas Light Co., where one has been in constant operation for many months. Another one, capable of exhausting from 50,000 to 70,000 cubic feet per hour, will be in operation in a few weeks, at the St. Louis Mo., Gas-Works.

D. McDONALD & CO.,

No. 51 LANCASTER STREET, ALBANY, N. Y.

MANUFACTURER OF

Station Meters, Wet Meters (with Iron or Tin Cases,) Dry Meters, Fancy, Experimental and Show Meters, Gas-Holders for Testing Meters, Pressure Guages, &c., &c.

We wish to call the attention of Gas-Light Companies, Gas Engineers, and all others who contemplate the purchase of Gas Meters, to the fact that we are now manufacturing, and prepared to fill all orders in the above line upon terms as favorable as any other manufacturers in the country.

Having improved, simplified, and so far perfected the mechanical construction of our Meters as to render them unquestionably equal, if not superior to any others now in use, we can confidently offer them to purchasers as such. The extreme simplicity of our Dry Meters renders their wear and liability to get out of order, less than any other Meter in the market. First-class workmen only employed, and the best materials used. All work warranted. ☞ Meters sealed by the State Inspector, according to the laws of New York.

CANNEL and COAL

OF THE BEST DESCRIPTIONS

FOR MAKING GAS AND COKE.

ANALYSES OF CANNEL,

Showing, from the most recent tests, the productive power (in volume) of each kind of material.

	GAS. Per ton, 2240 lbs. In Cubic Feet. At 60° temperature.	COKE. Per ton, 2240 lbs. Cwt.	Qrs.	Lbs.	Quality of Coke.	Ammonia Water in Gallons.	Tar in Gallons.	Illuminating power * per burner consuming 5 feet Gas per hour.	Price per ton free on board vessels in Liverpool	Price at $4.80 per £ sterling.
1	11,700	18	2	7	ood.	16	19	22.50	17s.	$4.08
2	11,000	18	1	16	"	18	16½	21.25	15s. 6d.	3.72
3	10,000	11	2	0	Inferior.	25	15½	20.00	14s.	3 36

ANALYSES OF COAL.

No.	GAS Per ton, 2240 lbs. In Cubic Feet.	COKE. Per ton, 2240 lbs. Cwt.	Qrs.	Lbs.	Quality of Coke.	Ammonia Water in Gallons.	Tar in Gallons.	Illuminating power * per burner consuming 5 feet Gas per hour.	Price per ton free on board vessels in Liverpool.	Price at $4.80 per £ sterling.
1	11,000	18	1	16	Good.	16	11½	14.00	11s. 6d.	$2.76
2	9,690	18	3	0	"	27	10	10.40	9s. 6d.	2.28
3	9,500	18	2	0	"	24	12	9.80	8s. 6d.	2.04

* Equal to Spermacetti Candles, burning 120 grs. per hour.

The above analyses embrace the best Cannel and Coal raised in the Lancashire, &c., districts, and are tabulated, for safety, rather below the average results. They are large, well screened, and free from dirt when delivered on board vessels, and are used for gas purposes at the chief gas works in England and on the Continent.

Orders for less than 50 tons, (*i. e.*, a boat load,) will be charged the cost of carting, viz., 1s. 6d. per ton.

The prices quoted will in all cases be subject to such alterations, more or less, as the case may be, as may arise in the market between the issue of this offer and the time at which the order may come to hand.

TERMS:—Cash, on presentation of the bills of lading at your bankers or agents in Liverpool, or as may be otherwise arranged, less 2½ per cent. discount

Also, HAND PICKED CANNEL and COAL, for house use.

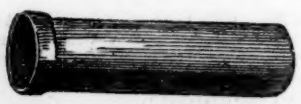
Concessions in prices made for large quantities.

GAS APPARATUS of all descriptions and on the most approved principles. Also, Purifying and other materials supplied.

ANALYSES, PLANS, and ESTIMATES, and other information required, and the highest references, furnished on application.

Contracts for materials and works entered into. No charge made for superintending shipments, preparing bills of lading, or passing entries.

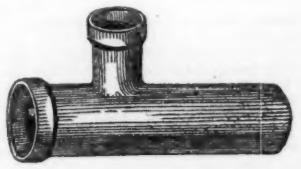
EMANUEL TURNER & CO.,
Export Offices, 34 Castle street, Liverpool, England.



GAS, STEAM, SMOKE, PURE WATER AND SOIL PIPES,

CLAY RETORTS, TILES, BRICKS,

AND EVERY VARIETY OF FIRE GOODS.



JOSEPH CLIFF,

WORTLEY FIRE-BRICK WORKS,

Near Leeds, England.

T. W. PARMELE, Agent, No. 4 Irving Place, New York.

CELLULAR GAS RETORTS. C. M. CRESSON'S CELLULAR GAS Retorts, Patented October 3d, 1854. Adapted to the manufacture of GAS from Rosin, Coal, Wood, &c., and now in use at the Philadelphia Gas Works. Patent Rights for sale. For information apply to HENRY S. HAGERT, Attorney for Patentee, S. E. cor. of Walnut and Sixth streets, Philadelphia, Pa.

ALFRED F. JAMES, Collection, Exchange and Land Agency, Galveston, Texas.
REFERENCE—John B. Murray, New York.

R. D. WOOD & CO., Manufacturers of Cast Iron, Gas and WATER PIPE; RETORTS, LAMP-POSTS, &c. S. W. corner 4th and Chesnut streets, Philadelphia. Works at Millville, N. J.

LOCKE & CRAIGIE, Plumbers and Gas-Fitters, No. 12 East 20th street, New York.

LOCKE, CRAIGIE & CO., Gas-Fittings, Chandeliers, Brackets, Globes, &c., No. 927 Broadway, New York.
☞ Particular attention paid to country work.

MORRIS, TASKER & CO., PASCAL IRON WORKS, [ESTABLISHED 1821.]
PHILADELPHIA, manufacture Wrought Iron Welded Tubes for Gas, Steam or Water; Lap Welded Boiler Flues,
GALVANIZED WROUGHT IRON TUBES.
ARTESIAN WELL PIPES,
of Wrought or Cast Iron, screwed together, flush inside and out; Gas-works Castings, Retorts and Bench Castings for Coal gas works; Cast Iron Street Mains, Bends, Branches, Drips, &c.
GAS AND STEAM FITTERS' TOOLS, &C.
STEPHEN MORRIS, CHAS. WHEELER,
THOMAS S. TASKER, STEPHEN P. M. TASKER.

MANHATTAN SAVINGS INSTITUTION, No. 644 Broadway, New York. Assets, January 1st, 1859, $1,183,600 98. Open daily from 9 A.M., to 7 P.M.
A. A. ALVORD, Secy. E. J. BROWN, Prest.

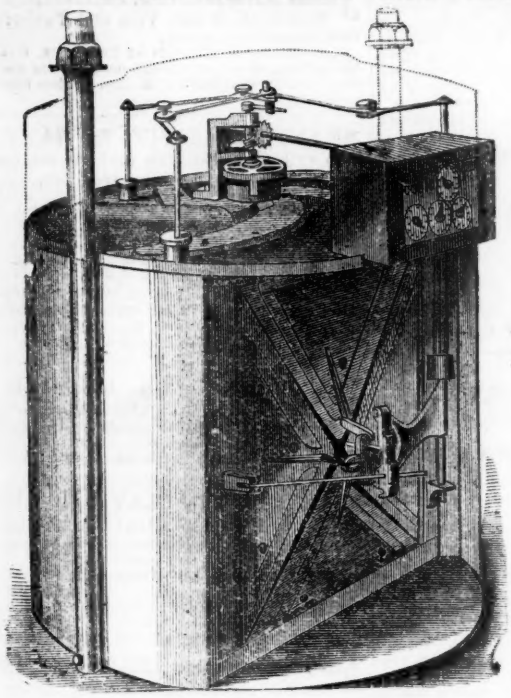
D. APPLETON & CO., Importers and Dealers in American and Foreign Books, publishers of Appleton's Railway Guide and of Appleton's Dictionary of Mechanics—a work indispensable to all engaged in the manufacture of Gas. 346 Broadway, New York.

JOSEPH LENNIG & CO.,

Nos. 313 and 315 NEW MARKET STREET, above Vine street,

Philadelphia, Pa.,

Invite particular attention to their



Patent Excelsior

ROTARY VALVE,

And Patent

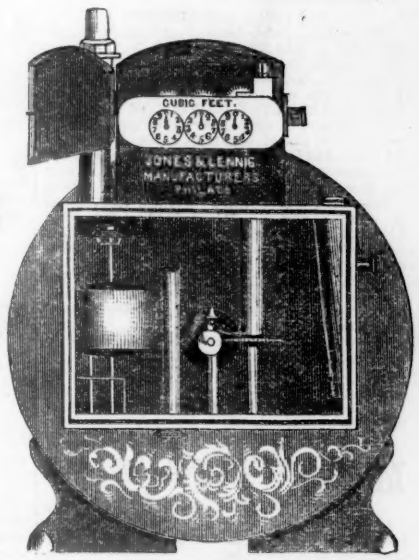
INLET CONDENSING CHAMBER

DRY GAS-METER,

And to their

UNSURPASSED

WET GAS-METER.



Both of which are certified, by experienced Gas Engineers, Builders and Superintendents of Gas works to be equal, if not SUPERIOR TO ANY OTHER METERS MADE.

An impartial trial and examination will *convince* every *intelligent* and *unprejudiced* mind of the *vast superiority*, not only of their *utility*, but also of their *Workmanship* and *Materials*. The materials used in their construction are *unsurpassed* in quality, and *undoubted* satisfaction is *guaranteed* to all purchasers.

Our Manufactory is now one of the *most extensive* in this Country, and we are thereby enabled promptly to execute orders to *any extent required*.

Our Meters speak for themselves, and we *caution* Engineers and Gas Companies against believing or being misled by *libelous circulars*. *Gas Officers are too intelligent to be deceived by such a series of misrepresentations.* We challenge superiority in both our Wet and Dry Meters.

MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS

MANUFACTORIES

SUFFOLK ST. CLERKENWELL GREEN. & ALLEN ST. GOSWELL ST. LONDON.

THOMAS GLOVER introduced his PATENT DRY GAS METERS into the United States and Canadas in 1846, and since that time he has received extensive patronage from many Gas Companies of those countries as well as from this. Thomas Glover confines his sole attention to the business of Gas-Meter making. The propriety of his doing so is satisfactorily proved by his success. For example: one London Company has now in use above 12,500 of his Patent Dry Gas-Meters, and some of these Meters have been fixed for fourteen years and are still in working order, without complaint from either the company or the consumer.

THOMAS GLOVER thinks it necessary to put Gas Companies on their guard against parties selling Patent Dry Gas-Meters constructed in imitation of his, but unskilfully made on erroneous principles, and with improper and unsuitable materials.

THOMAS GLOVER'S Workshops are now the most extensive in this or any other country, and he is thereby enabled promptly to execute orders to any extent required. Purchasers may, at any time, inspect his Works and the materials of which his Meters are constructed.

Suffolk Street, Clerkenwell, London, and 1 Barrett Street, Fulton Street, Boston.

JOHN ROGERSON & CO., NEW-CASTLE ON-TYNE & Middlesbro'-on-Tees, London, supply Gas Coal, Clay Retorts, Cast Iron Pipes and Retorts, Gasometers, &c. A partner of the above house being now in this city, will be glad to wait upon any gas company requiring supplies.
Agents, MEAD & BELL,
17 William street, New York.

GAS-COAL.—PENN COAL CO.— The Penn Coal Company having completed arrangements for mining and shipping coal on an extensive scale, are now prepared to receive orders. The mines are favorably located on the line of the Pennsylvania Railroad, 26 miles east of Pittsburgh, Pa. The coal has been tested by many gas works, and the highest testimonials will be furnished. Communications addressed to Mr. A. L. Massey, Philadelphia, will have immediate attention

GROVER & BAKER'S celebrated Noiseless Sewing Machines, at greatly reduced prices, No. 495 Broadway, New York.

THE WILLCOX & GIBBS' FAMILY Sewing Machines. The best family machine in the market, prices from $30 to $50. 504 Broadway, New York.

NORRIS & GREGG,

DEALERS IN WROUGHT IRON Pipe, and Manufacturers of Fittings for Steam, Gas, and Water, Nos. 62 and 64 Gold street, (between Beekman and Fulton streets,) New York.
THOMAS H. NORRIS. CHARLES GREGG.

WHEELER & WILSON'S Sewing Machines, No. 505 Broadway, New York. The very best in use. Send for a circular.

F. A. SABBATON, ALBANY, N. Y., Gas Engineer and Contractor. COAL AND ROSIN WORKS of any capacity constructed on the most approved plans.
Refers to CHARLES ROOME, ESQ., Prest. Manhattan Gas-Light Co., N. Y.; R. PUMPELLY, ESQ., Prest Albany, N. Y.. GAS LIGHT CO..: J. K. BRICK, ESQ., Engineer Brooklyn, N.Y., Gas Co.

DRAIN-PIPE. JAMES P. HAMMILL, Importer and dealer in best English FIRE-BRICK, FLOOR, MALT, AND ROOFING TILES, DRAIN PIPE, GAS PIPE, &c. 155 Water street, New York City.

DAVID JONES.

ORNAMENTAL JAPANNER, South-west corner of Ninth and Melon streets, Philadelphia, respectfully solicits a liberal share of patronage from the manufacturers of Gas-Meters and others He is prepared to execute all orders for Japanning promptly and reasonably.
Reference—Code, Hopper & Gratz, Gas-Meter Makers, Phila.

CLEGG'S TREATISE ON COAL-GAS Manufacture, third edition, with full instructions upon every detail incident to Gas-making, illustrated by engravings. A large supply has arrived. No gas company or engineer should be without it.
For sale at Rooms of the AMERICAN GAS-LIGHT JOURNAL, New York.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE, ENGLAND,
Manufacturer of CLAY RETORTS, FIRE BRICKS, and every description of FIRE CLAY GOODS.

TO GAS-COMPANIES, ENGINEERS, Merchants, Gas-Fitters, Surgical Instrument Makers, &c.

FLEXIBLE GAS FITTINGS.

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This is the only TUBING that perfectly resists the action of coal gas. It is made of all sizes, from ⅛ inch up to 1¼ inches, and in 60 feet lengths. The measure is always external diameter, to connect the usual metal fittings.

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The principle of the invention consists in the gas being (in its passage through the burner) resisted primarily by a FIBROUS MATERIAL, thence passing through a diaphragm of felt encased in two perforated metallic discs, so that the pressure with which the gas is supplied from the mains becomes checked, and permits the gas to reach the orifice of the burner with only such velocity as may be requisite to develope a FULL AND BRILLIANT FLAME while perfect combustion is simultaneously secured, and thus is prevented the escape of unconsumed gases which so deteriorate the atmosphere as to produce a most injurious effect upon the health, and are alike destructive of works of art.

HERBERT WILLIAM HART,
69 Fleet street, London.
Or care of AMERICAN GAS-LIGHT JOURNAL, N. YORK.
(For engravings see AMERICAN GAS LIGHT JOURNAL for December, 1859, page 100.)

BY ROYAL LETTERS PATENT.

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No 7 Whitehall Place, London.
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Samples of the above castings can be seen at the Rooms of the AMERICAN GAS-LIGHT JOURNAL.

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REFERENCES:
John C. Cresson, Engineer Gas Works, Philadelphia; Joseph A. Sabbaton, Engineer Manhattan Gas Works, New York; Col W. S. Campbell, Engineer Gas Works New Orleans; P. A. Sabbaton, Engineer Gas Works, Albany; Waterhouse and Bowes, Gas Engineers, Raleigh, N. C.; Joseph Battin, Newark, N. J.; C. B. Dungan, Philadelphia.

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FOR GAS MANUFACTURE AND HOUSE USE.

THE undersigned does not submit for comparison the result of chemical analysis, as this plan is too often adopted to promote the sale of inferior or worthless coals that in practice bear no particle of resemblance to their theoretical, and sometimes distorted descriptions.

He is authorized, however, to guarantee the *careful shipment of the best qualities of Cannel and Coal, at the lowest rates of Invoice and Freight offered at time of engagement;* and any losses sustained by short weight, or the neglect of the conditions mentioned, will be promptly and cheerfully repaired.

OFFICE OF THE MANHATTAN GAS-LIGHT COMPANY,
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I am, gentlemen, your very obedient servant,
CHARLES ROOME, *President.*

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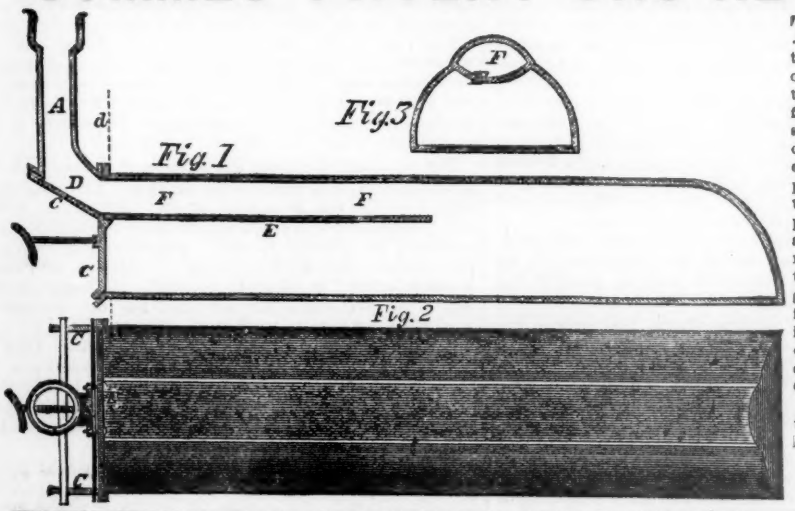
SYMMES' PATENT GAS-RETORT.



THIS cut represents a new mode of connecting retorts to the "stand pipes" without using "mouth pieces," thus saving the drilling the flanges and making the joints, as well as some 250 lbs. of casting, and several bolts for each retort set. A narrow piece of the door, C, closes the lower end of the stand pipe. The plate, E, is a separate piece, thinner than the retort, and may be secured to the door, C, or slid over grooves made in the retort for that purpose. The retort is set in the ovens to the dotted line, *d*. This mode of connecting may be applied to Clay as well as iron retorts.

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GAS-LIGHT BURNER.

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Furman Street, near Fulton Ferry, Brooklyn, N. Y.

Samples are on Exhibition at Rooms of American Gas-Light Journal.

HISTORY OF BALLOONING.

Chapter I.

Now that this country is thoroughly aroused on the question as to whether practical use can be made of balloons as at present constructed and as their general use will cause a largely increased consumption of carburetted hydrogen gas for inflation, we have gleaned some interesting facts from Wise's system of æronautics.

There are among us men, and some of them sensible men, too, on other subjects, who affect to believe the day not far distant when carriages jolting over rugged pavements will be discarded, as a relict of barbarism, horses turned to agricultural uses exclusively, and the balloon adopted in their stead as a matter of daily use. And, laugh not, gentle reader; it would be no approach to the incredible, that the story of the telegraph would be to Rip Van Winkle or Wouter Van Twiller, or those veritable Dutch burgomasters to whose portfolios, the composition of a letter bore the relation of a journey from New Amsterdam to Albany in the olden time.

It may be, perhaps, worthy of comment that that splendid specimen of a balloon which lately filled the pipes of the sturdy Knickerbockers with ærial gossip, should owe its conception to a man of acknowledged Lowe associations combined not inconsistently, perhaps, with such *high aspirations!*

Professor Wise asserts that from the records of earliest history the mind of man was directed to the investigation of the art of flying and navigation of the atmosphere, incited, perhaps, by a species of envy of the feathered tribe whose easy and graceful locomotion and entire independence of earthly supports, were a contrast to the plodding character of man's fleetest movements.

The first account on record of a positive success appears to be Archytas' flying pigeon which was invented by this geometrician of the Pythagoras school about four hundred years before the Christian era. The historian Aulus Gellius, who wrote during the Age of Brass, says, that "Archytas constructed a wooden pigeon which could fly by means of mechanical powers and an *Aura Spirit.*" Its buoyancy seems to have been effected by magnets; but the propelling power is attributed to an occult (the occult sciences in the middle ages were *magic, alchemy,* necromancy, &c.), the indispensable accompaniments to ancient works of wonder.

Another writer says of this artificial bird, "Archytas, philosopher of Taranto, constructed a wooden pigeon which could fly; but if it fell to the ground, it could not raise itself up again."

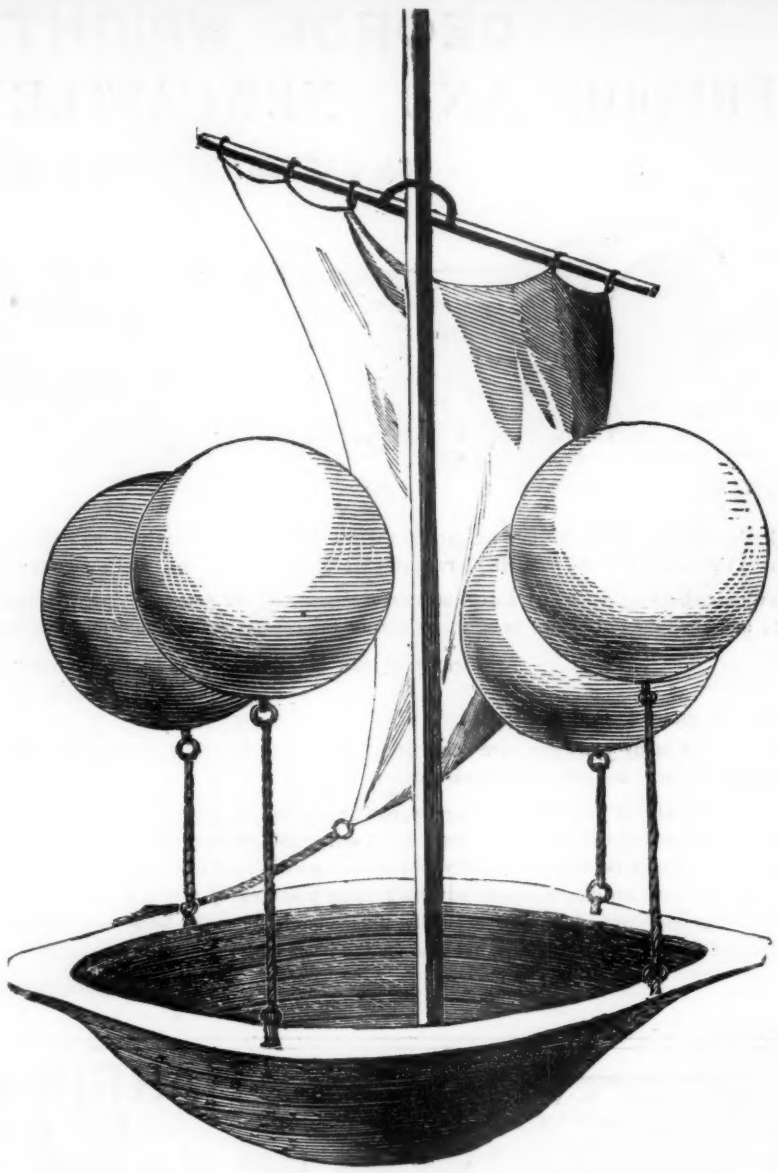
Modern writers think that by the "Aura Spirit," might be meant rarefied air or hydrogen gas, but if gas or rarefied air had been used to give it buoyancy, the machine would have been necessarily of great size and could hardly have retained such resemblance to a pigeon which all the writers coincide in calling it without referring to its extraordinary size. Besides this the process of inflation with rarefied air or hydrogen gas would have been so conspicuous an operation as to have ensured some account of it to have been mentioned. It is not at all probable moreover that Archytas had any knowledge of gases.

The next account that we find in history is of a man who, it is said by Antonias Byerlink, flew high in the air in the city of Rome under the reign of Nero, but lost his life in the descent, caused, as the historian asserts, by the displeasure of the æronaut's evil genius who, when aloft, let him drop without due notice.

Roger Bacon, an eminent philosopher of the thirteenth century who, from his genius and ability, won for himself the title of the "Admirable Doctor," appears to have been the first who undertook the true principles of ærostation. Wise thinks him to have been like Franklin, three or four hundred years ahead of the age he lived in, because the theories laid down by him, were some three hundred years later fully realized. The discovery of the principle of sailing in the air on atmospheric buoyancy is therefore accredited to Roger Bacon, who, after descanting upon the possibility of constructing engines of minor size and powers to traverse the land and water with great speed, goes on to describe a plan for navigating the air. He assumes that the atmosphere is a material of some consistency capable of bearing upon its *surface* vessels, like ships borne upon the surface of the water. He then describes the construction of his proposed ærial machine, which he says, "must be a large *hollow globe* of copper or other suitable metal wrought extremely thin, in order to have it as light as possible." He adds, "it must then be filled with 'etherial air or liquid fire,' and then launched from some elevated point into the atmosphere where it will float like a vessel on the water."

Bacon does not reveal whether he ever realized his plans, but he does say that "he knew a man" who contrived a flying machine that did succeed, and adds "there may be made some flying instrument so that man sitting in the middle of it, and turning some mechanism, may put in motion some artificial wings which may beat the air like a bird flying." History assures us that the famous John Mullen, called Regiomontanus, constructed an artificial eagle at Nuremburg, which flew out to meet the Emperor Charles V., and accompanied him back to town. Elmerers, a monk, is said to have flown about a furlong from the top of a tower in Spain about the same time.

The great painter, Leonardo de Vinci, is stated by Cuperus, in his treatise on the Excellence of Man, to have practiced the art of flying. Next comes John Wilkins, Lord Bishop of Chester, who died in the year 1672, who says in his work entitled "Discovery of the New World," "it is a pretty notion to this purpose mentioned by Albertus de Saxonier, and out of him by Francis Mendonca, that the air, in some part of it, is navigable, and that upon this stated principle any iron or brass vessel, (suppose a bottle,) whose substance is much heavier than that of water, yet being filled with air, it will swim upon it and not sink. To suppose a cup or wooden vessel upon the outward borders of the atmosphere, the capacity of it being filled with fire, or rather ethereal air, it must necessarily, upon the same ground remain there, and, of itself, no more fall than an empty ship can sink."



LANA'S AERONAUTIC VESSEL.

Some writers have, from this, contended that Bishop Wilkins discovered the art of flying; but Wise thinks, that, on the contrary, his most plausible plan is taken from Roger Bacon's treatise, which, he adds, is the balloon principle.

Philosophers, from Brewer's time down to the discovery of the true nature of atmospheric pressure, as illustrated by the Torricellian tube and air pump, seemed to have entertained the opinion that the atmosphere had a defined limit or border, not very high above the earth, upon which the aerial vessel must be placed in order to have it buoyed up underneath, like water under a ship.

In the seventeenth century great interest was manifested by many able writers on the subject, aided by numerous experiments that were going on; and at this time Francis Lana, a jesuit and a judicious writer, deduced from the new discoveries the real nature and pressure of the atmosphere, and established a theory of mathematical accuracy, which placed him in advance of his predecessors in the science of aerial navigation. He inferred correctly that a vessel exhausted of air would weigh less than when full of that fluid; and he shows in his problems, that the capacity of globular vessels increases much faster than their surfaces. For example, two globular vessels, one of ten feet diameter, and another of twenty feet diameter; the first will have a capacity of 523 cubic feet and a fraction over, and the other will have a capacity of 4189 cubic feet. The surface of the larger is about four times that of the smaller, while its capacity or contents is eight times as great. This is a very important consideration in the construction of balloons. Thus, a balloon that would carry one person, would weigh one hundred pounds, and would cost two hundred dollars, while one capable of carrying two persons would not weigh more than one hundred and fifty pounds, nor cost more than three hundred dollars.

Now, a balloon of the power first mentioned would be about twenty feet in diameter, which, filled with ordinary hydrogen gas, would have an ascending power of 250 lbs., while one of five times its diameter, being one hundred feet, would have an ascending power of 32,725 lb., which would be capable of carrying 136 men, independent of its own weight and appendages.

Lana proposed to prepare four hollow globes of copper, each twenty feet in diameter, and so thin that they would weigh less than an equal bulk of atmosphere, when exhausted of air. To these globes he designed fastening a boat, in which the aeronaut would be stationed for the purpose of directing the machine. Although Lana's idea involves the same principles by which aeronautics are practised at the present day, still there are obstacles which render his plan impracticable. The copper of which the balloons were to have been made, must necessarily have been so thin, to make the vessels light enough, that they would not have had the strength to resist the external pressure of the atmosphere, when they were exhausted.

The barometer by which the pressure of the atmosphere is ascertained, was discovered in 1643. The immense weight of the air, as shown by the Torricellian tube, being about 15 lb. to every square inch of surface, was, no doubt, the stimulus to Lana's proposition of the copper globes. His work entitled "Prodromo dell'Arte Maestra Brecia," in which he describes his machine, appeared in 1670, while the air-pump was not invented, or at least not known, until 1672. The weight of the air is 1, 2–10th ounces to the cubic foot; at this rate, Lana's globes of twenty feet diameter would each have displaced 4189 cubic feet, making in all 16756 cubic feet, weighing 1256 lb.; so that whatever less than this his globes and appendages would have weighed, would have been the ascension power of his aerial machinery.

The surface of one of these copper globes would have been 1256 square feet, which, at the common pressure of the atmosphere on the surface of the earth, would have an external pressure of 2,712,960 lbs., a force sufficiently great to have crushed it had it been made light enough to be raised by atmospheric buoyancy. Had Lana known the exact pressure and specific gravity of the air, his mathematical knowledge would have at once suggested to his mind the impracticability of his machinery.

A few years ago Lana's plan was attempted in Paris. In this experiment the balloon was composed of silk, and the vacuum was to have been formed by forcing the balloon open by the aid of light framework arranged with ropes and pulleys fixed in the inside of it.

We lose sight here of Lana and his copper globes. Our next chapter will exhibit a material advancement in the art of aerial navigation, which matured from the point that we shall next attain, with surprising rapidity and success.

GRIFFIN'S PATENT BLAST GAS FURNACE.

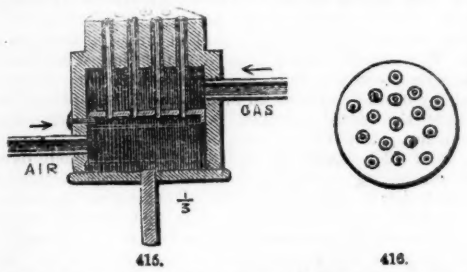
The Patent Blast Gas Furnace

Consists of two parts, namely, of a particular form of Gas-burner, which is supplied with gas at the usual pressure, and with a blast of common air, supplied by bellows or a blowing machine, at about ten times the pressure at which the gas is supplied.

Secondly, of a Furnace, which is built up in a particular manner, round the flame that is produced by the gas-burner, and the crucible that is exposed to ignition. The object of the particular construction of this furnace is to accumulate and concentrate in a focus the heat produced by the gas flame, and to make it expend its entire power upon any object placed in that focus.

This apparatus can be made of various sizes, according to the amount of work which is required from it. I shall describe a few varieties of the furnace, and the results of some experiments made with them, which will show the reader what kind of work it is able to execute.

The Gas-burner.—The gas-burner is a cylindrical iron reservoir, constructed as shown in section in fig. 415,



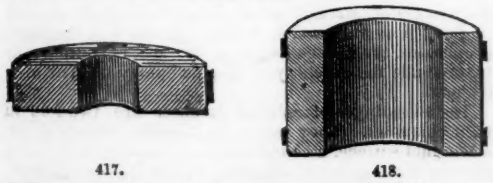
415. 416.

which is drawn on a scale of one-third the full size. It contains two chambers, which are not in communication with one another. Into the upper chamber, gas is allowed to pass by the tube marked GAS. Into the lower chamber, air is forced by the tube marked AIR. The upper part of the burner is an inch thick in the metal. Through this solid roof holes are bored for the escape of the gas. The experiments described hereafter were made with a burner that contained sixteen holes, arranged as shown in fig. 416, which is a surface view of the burner represented by fig. 415. But burners with six holes, and with twenty-six holes, have been made for other purpuposes. The number of holes depends, of course, upon the heating power required from the burners. The air passes from the lower chamber, through a series of metal tubes, placed in the centre of the gas holes, and continued to the surface of the burner, so that the gas and air do not mix until both have left the gas-burner, and then a current of air is blown through the middle of each jet of gas. The bottom of the gas-burner is made to unscrew, and the division between the two chambers, which carries the air-tubes, is easily removable, for the purpose of being cleaned. The GAS and AIR pipes which I have used are an inch in the bore, and are ten inches long; the gas has usually had a pressure of half an inch of water, and the blast of air about ten times that pressure. The quantity of gas used in an hour was about 100 cubic feet. The stopcock which supplied it had a bore of half an inch. The round rod, which is represented at the bottom of the burner, fig. 415, is intended to fit it to the support, shown by *b*, in figs. 430 to 433.

When the gas is lighted and the blast of air is put on, the flame produced by the gas-burner is quite blue, and free from smoke. It is two inches in diameter, and three inches high, and the point of greatest heat is about two inches above the flat face of the gas-burner. Above this steady blue flame there rises a flickering ragged flame, several inches in height, varying with the pressure of the gas. In the blue flame, thin platinum wires fuse readily.

When the gas is burning in this manner, and the apparatus is attached to flexible tubes, the burner may be inverted or held sideways, without disturbing the force or regularity of the flame, so that the flame may be directed into a furnace at the bottom, the top, or the side, as circumstances may require.

The following articles are used in building up the gas furnace for different experiments. They vary in size according to the volume of the crucible, or the weight of the metal which is to be heated, but I may give a general idea of them by saying that figs. 417 to 429 are drawn of about one-sixth part of the actual size of the articles which they respectively represent. The scales of figs. 430 to 433 are marked upon them.



417. 418.

Fig. 417 represents a section of a circular plate of fire-clay, two inches thick, with a whole in the center, which exactly fits the upper part of the gas-burner, which is made to enter into the hole three-quarters of an inch. In external diameter, this clay plate agrees with each size of furnace.

Fig. 418 represents a section of a cylinder of fire-clay, of which two pieces are required to constitute the body of each furnace. In the middle of each cylinder, a trial-hole is made, one inch in diameter, to which a fire-clay stopper is adapted.—See fig. 430.

419. 420. 421.

Fig. 419 is a section of a fire-clay cylinder, closed at one end, and pierced near the open end with six holes, of half an inch in diameter. The thickness of the clay is immaterial.

This cylinder is three inches high and three inches in diameter.

Fig. 420 represents a circular plate of fire-clay, two and a half inches or three inches in diameter, and one inch thick. Similar pieces half inch thick are useful.

Fig. 421 is a cylinder of plumbago, to be used as a crucible support. It is three inches inside diameter and one inch in hight. It is pierced with twelve holes of three-eighths of an inch bore.

422. 423. 424.

Fig. 422 is a similar cylinder of plumbago, two inches high, pierced with twenty-four holes of three-eighths of aninch bore.

Fig. 423 is of the same nature and material, but is three inches in hight. It has twenty-four holes of three-eighths of an inch bore.

Fig. 424 is a thin plate of pimbago, three inches in diameter, namely, of the same diameter as the above three cylinders. It has a small hole in the middle, and being of a soft material, the hole can be easily cut or filed to suit crucibles of any desired size.

To suit the larger kinds of crucibles and furnaces, cylinders are made resembling fig. 423 in form, but of greater diameter.

As in all cases the heating power of the gas-furnace spreads laterally, and does not rise vertically, the most advisable form of the crucibles required for use in it, is *short and broad*, not tall and narrow, and the supporting cylinders must be shaped accordingly. No fire-bars or grates can be used to support crucibles in this gas furnace, because no material formed into narrow bars, can sufficiently withstand its powers of fusion and combustion.

425. 426.

Fig. 425 is a plumbago cylinder, or crucible-jacket, two and a half inches high, two and a half inches in diameter, and a quarter of an inch thick in the walls. It has six holes of three-eighths of an inch diameter near one end.

Fig. 426 represents a circular cover or dome, flanged at the bottom, and having a knob or handle at the top. It is pierced with twenty-four holes of a quarter of an inch in diameter, arranged in two rows near the bottom. This dome, when of small size, is made of plumbago. When of large size, of fire-clay.

427. 428. 429.

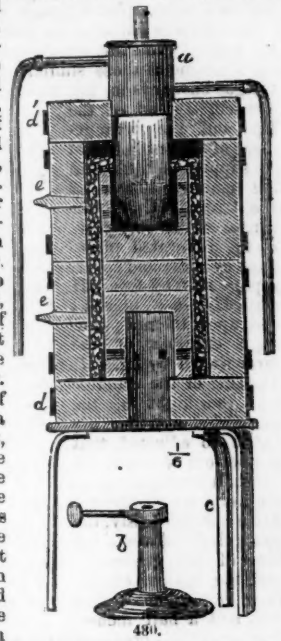
Figs. 427 and 428 represent plumbago crucibles made with a solid overhanging rim, the use of which is to suspend the crucibles of the gas-burner, by means of the cylinders, figs. 421 to 423. When the crucibles are too small to fit the cylinders, the flat plate, fig. 424, is filed to fit the crucible, and is then placed on the cylinder, to whose diameter it is adapted.

Fig. 429 is an ordinary crucible of porcelain or platinum.

Besides these pieces of fire-clay and plumbago, it is necessary to be provided with a strong iron tripod, to sustain the furnace, as represented by *c*, in figs. 430 to 433; an iron pan, in which to place the furnace; and a quantity of gravel, or rounded flints, not less than half an inch, nor more than one inch, diameter. These pebbles form an essential part of this gas furnace.

Gas Furnace, heated at the Top, exhibited in Section by fig. 430.—*a* is the gas-burner, fig. 415; *b* is the support for it, when used below the furnace; *c* is the iron tripod support for the furnace; *d*, *d*, are two perforated clay plates, like fig. 417, adapted to the gas-burner *a*; *e*, *e*, are two clay cylinders, like fig. 418. These pieces, *a*, to *e*, are similar in all the furnaces represented by fig. 430 to 433, and will not require description to each example.

The interior of the furnace, as represented by fig. 430, is built up as follows:—The clay plate, *d*, is put upon the tripod *c*. Over the central hole in *d*, the clay cylinder, fig. 419, is placed, and upon that cylinder two or three of the clay plates represented by fig. 420. Upon these a porcelain or platinum crucible similar to fig. 429, is placed. If it is of platinum, a piece of platinum foil may be put between the crucible and the uppermost clay plate, to protect the crucible from contact with particles of iron, or against fusion with the clay. The crucible is to be covered by the plumbago jacket, fig. 425. The space between this pile in the centre of the furnace and the two cylinders, *e*, *e*, which form the walls of the furnace, is to be filled with flint stones or gravel, washed clean and dried. The stones which answer best are rounded, water-worn pebbles, of half an inch to one inch diameter. These may be piled up to the top edge of the jacket, fig. 425. The number of clay plates, fig 420, must be such as to bring the top of the crucible, fig. 429, to the distance of two inches, or two and a half inches at the utmost, from the flat face of the gas burner, *a*. In some cases, merely one of the furnace cylinders, *e*, is necessary, in which case the crucible and its jacket is placed directly upon the cylinder, fig. 419, and when only a moderate heat is required, even the packing with pebbles may be dispensed with. Another means of diminishing the heat is that of increasing the distance between the gas-burner and the crucible.



430.

The apparatus being thus arranged, the gas is to be turned on, and to be lighted, the blowing-machine is to be put into action, and the nozzle of the gas-burner is to be depressed into the central hole of the clay plate *d*, as shown in fig. 430. The whole force of the blue flame then strikes the crucible; part of it forces its way through the holes in the jacket, fig. 425, and part of it rises and passes over the upper edge of the jacket; after which it forces its way downwards between the pebbles. The carbonic acid gas and the vapour of water which result from the combustion of the gas, together with the nitrogen of the air, and any uncombined oxygen, accompany it. No space being left open for the escape of these gases at the upper end of the furnace, they go downwards through the interstices among the pebbles, and passing through the holes in the cylinder, fig. 419, and through the central hole in the lower plate *d*, fig. 430, they escape finally into the air. In this progress, the hot gases give up nearly all their heat to the flint stones. Water and gases escape below at a very moderate temperature, water even runs down in the liquid state, while the stones rapidly acquire a white heat, and if the blast and the supply of gas is continued, they retain that white heat for any desired length of time—for hours.

At the end of ten minutes after lighting the gas, the crucible, placed in the described circumstances, and exposed to the full action of the heat of the gas, and surrounded by substances which are bad conductors of heat, is raised, with the jacket and pebbles around it, to a white heat. The consequence is, that the full power of the gas-jet is then exerted upon the crucible and its contents, and those effects are produced which will be described presently.

If it is desired to inspect the substance subjected to the action of heat in this furnace, the gas-burner is lifted out, and the crucible is examined through the hole in the clay plate. To make it possible to inspect substances at a white heat, the view is taken through a piece of dark cobalt blue glass. If the substances submitted to heat suffer no harm from the action of oxygen, it is better to dispense with a crucible cover, and to direct the jet of flame directly down upon the substance to be heated. The action is then more rapid. When the burner is taken out the substance in the crucible can be stired if it is considered necessary.

The following experiment will give an idea of the power of a furnace of this description. A common clay crucible, three inches high and three inches diameter at the mouth, was filled with about twenty-four ounces of cast iron. It was mounted like fig. 430, in a furnace of four inches internal diameter, and eight inches deep. The pebbles were filled in to the edge of the crucible. No crucible-cover and no jacket were used. The flame was thrown directly upon the iron. In a short time, the iron melted, the oxygen then converted some of the cast iron into magnetic oxide of iron, which formed a thin, infusible mass, on the surface of the cast iron. At twenty minutes from the lighting of the gas, the furnace was dismounted. The crucible was taken out. A hole was broken by an iron rod in the infusible surface of oxidized iron, and the fused cast iron below it was decanted into a mould, and made a clear casting weighing twenty ounces.

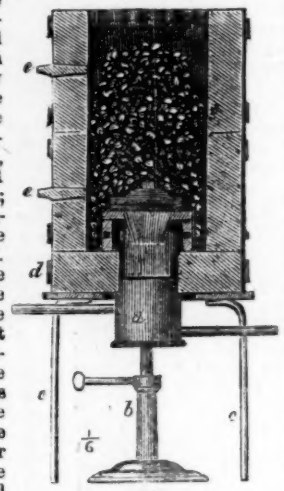
In the same small furnace thirty-two ounces of copper can be fused in fifteen minutes. When the furnace is hot, that quantity of copper or cast iron can be fused in ten minutes.

In a furnace of the same dimensions, but with a gas-burner having only six, instead of sixteen jets, sixteen ounces of copper or of cast iron can be completely fused

in ten minutes if the furnace is cold, and in seven minutes if the furnace is hot.

These experiments show that within twenty minutes a heat is producible in this little furnace which is more than sufficient for the decomposition of silicates by fusion with the carbonates of potash, soda, or barytes.

Gas Furnace heated at the Bottom, exhibited in Section by fig. 431.—In this furnace the parts marked *a*, *b*, *c*, *d*, *e*, *e*, are the same as those similarly marked in fig. 430; but the gas-burner is in this case put into the bottom of the furnace, instead of the top, and the arrangement of the crucible and its support is altered in the manner shown by the figure. Upon the centre of the clay plate *d*, the perforated plumbago cylinder and cover, represented by figs. 421 and 424, are placed; and upon them a plumbago crucible of the form shown by fig. 427. The size of the crucible and the hight of the perforated cylinder are to be so adjusted that the bottom of the crucible shall be struck by the hottest part of the gas flame: that is to say, the space left between the face of the gas-burner and the bottom of the crucible must not exceed two and a half inches.



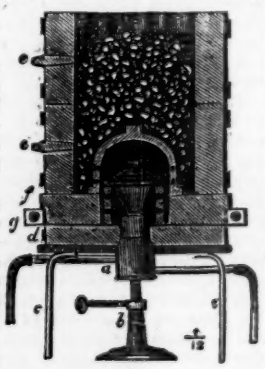
431.

The crucible is provided with a closely-fitting cover, and pebbles are then filled in between the crucible jacket and the furnace cylinder *e*, and are covered over the crucible until both the pieces of the furnace *e*, *e*, are filled. The gas is then lighted, the blast of air is set on, the gas burner is forced up into the hole in the clay plate *d*, and the operation proceeds. In from ten to twenty minutes after the gas is lighted—this difference of time depending upon the size of the furnace and the weight of the metal contained in the crucible—the interior of the lower cylinder *e*, acquires a white heat. The progress of the operation can be watched by occasionally removing the stone peg in the trial hole of the furnace cylinder *e*. The heat very slowly ascends into the upper cylinder, and it becomes so great in the upper as in the lower cylinder. The greatest fusing power of the furnace is confined within a vertical space of about six inches, reckoning from the bottom. The power of flint pebbles to abstract heat from the gases which pass through this apparatus is is quite remarkable. When about six inches of pebbles lie above the crucible, and the crucible and the pebbles about it have been white-hot for half an hour, the hand can be held over the top of the furnace, within a few inches of the pebbles, without inconvenience. It becomes wetted with the vapour which rises from the furnace, but feels only a moderate degree of heat.

This form of the furnace is attended by the inconvenience that you cannot examine the condition of the matter contained in the crucible, to ascertain when the heat has been continued long enough. In cases where the fusion is perform repeatedly on the same weight of metal, this would be of no importance, because the power of the furnace is so steady and regular that the time of firing which has been found to answer once will answer the same purpose again.

When it is supposed that the fusion of the metal submitted to trial is completed, the gas is first to be turned off, and then the supply of air stopped. You can neither allow the furnace to remain intact till it is cold, or lift off the cylinders *e*, *e*, with tongs, and allow the hot stones to fall into the iron pan placed below the furnace to receive them. A few bricks should be laid between the pan and the table or stool on which it rests, if the latter is made of wood; because the heat given off by the pebbles is very great. The pebbles being raked away from the crucible, the contents of the latter can be examined.

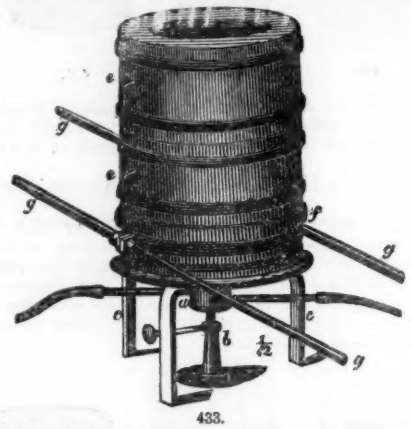
Gas Furnace heated from below, and provided with a lifting apparatus, to afford access to the crucible; exhibited in Section and in perspective by figs. 432 and 433.



432.

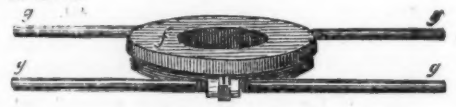
This modification of the furnace is contrived to afford the means of inspecting the contents of the crucible, without serious interruption to the process of ignition. The apparatus is shown in section by fig. 432, and in perspective by fig. 433. Besides the pieces that are similar to those which form the other furnaces, this furnace has two additions, a *lifter* and *dome*.

The *lifter*, represent by *f*, in figs. 432, 433, and separately by fig. 434, is a plate of fire-clay, two inches thick, and having a central hole, *large enough* to go easily over the crucible jackets and crucibles represented by figs. 421 to 424, 427, and 428; and *small enough* to permit the plate to carry and lift up the *dome*, fig. 426, when of a sufficient size to cover the crucible. The lifter is bound with a ring of stout iron, and is screwed to two iron rods, *g*, *g*, of from half an inch to three-



433.

quarter inch in thichness, and three to four feet in length, according to the size and weight of the furnace to be lifted.



434.

The packing of this variety of furnace is performed as follows: the clay plate *d*, and the lifter *f*, are placed upon the tripod-stand. The crucible jacket, fig. 423, or similar one, but of larger size, is placed upon the plate *d*. The crucible and its cover is then put into its place, and is covered with the dome, fig. 426, which must rest upon the lifter *f*, and must be of such a width as to clear the crucible easily when lifted. The internal hight of the dome should be such as just to clear the top of the crucible cover. Consequently, where crucibles of different sizes are used, domes of different sizes are also necessary. Observe, distinctly, that the crucible and its support are to rest upon the plate *d*, and the dome upon the lifter *f*. The furnace cylinders, *e*, *e*, are now to be superposed, and the space between the dome and the cylinders, and that above the dome, are to be filled with small pebbles as already directed. The gas may then be lighted, the blast of air set on, and the operation be allowed to proceed.

When the ignition has been continued as long as is considered necessary, or when you wish to inspect the contents of the crucible, the gas is to be turned off, the blast of air stopped, and two men, holding the bars *g*. *g*, are steadily to lift up the whole upper part of the furnace, namely, the lifter *f*, the two cylinders *e*, *e*, the dome, and the pebbles; leaving the clay plate *d*, with the crucible and its jacket, both at a white heat, standing clear in the middle. The cover of the crucible is then to be lifted, and the contents examined. If the fusion is not completed, the furnace is to be carefully lowered into its former position, the gas is to be turned on, and the blast renewed. This interruption of the process scarcely occupies a minute. I have already mentioned that, for the convenient inspection of the crucible at a white heat, it is necessary to look at it through a piece of dark-blue glass.

The figures of the gas furnaces are drawn to scales, which show the relative proportions of the different parts. The absolute sizes of the furnaces depend upon the amount of work required from them. The fusions described below were mostly made in a furnace of six inches internal diameter, a few in a furnace of four inches internal diameter, and one or two in a furnace of eight inches internal diameter; all of them with a gas-burner of sixteen holes, and a supply of gas obtained from a half-inch pipe. A large furnace on the plans of figs. 432, 433, and with an internal diameter of twelve inches, will demand a gas-burner of twenty-six holes, and a supply of gas from a pipe of nearly one inch in the bore.

Examples of Fusions effected by the Blast Gas Furnace.—The fusing points of certain metals have been fixed by Daniell at the following temperatures:

Silver	1873° F.	Copper	1996° F.
Gold	2016° F.	Cast iron	2786° F.

Brass, with 25 per cent of zinc, at 1750° F.

All these metals melt readily in the gas furnace. Quantities of three lbs of copper or cast iron can be completely fused in fifteen minutes in a six-inch furnace. Quantities of 8 or 10 lbs. of copper or cast iron can be completely fused into a homogeneous mass in a six-inch or eight-inch furnace within one hour, using a sixteen-hole burner, and a supply of gas from a half-inch pipe.—*London Pharmaceutical Journal.*

HOWDEN'S SAFETY LAMP.—A new safety lamp for miners has been patented, after seven years' work on the invention, by Messrs. Howden of the Union Foundry, Wakefield, England. It is in appearance and construction like an ordinary Davy lamp, but is said to give a light equal to almost five of Davy's. It is so constructed that instead of the gauze becoming heated and liable to to ignite inflammable gas, it remains cool, and actually consumes the noxious vapor. Successive trials, with the Stephenson lamp, in the most dangerous parts of the coal pits in the neighborhood of Wakefield, demonstrated the superiority of Howden's.

PRACTICAL MANAGEMENT OF GAS-WORKS.

[*Continued from Page* 176 *of the* AMERICAN GAS-LIGHT JOURNAL.]

Having made the joint, and allowed sufficient time for the cement to harden, the retort is ready to be placed in its bed, but before alluding to the settings, a few remarks, having general application to the construction of the furnace or fire-bag, are appropriate.

Until quite recently, it was the custom in this country to use a furnace of the width of 12 inches, preserved continuously from the grate bearers to, or above the surface of combustion. A careful observation has now decided that a large surface of combustion relatively to the grate space is advisable, as securing a more perfect utilization of fuel; we find, accordingly, that wide furnaces have become the order of the day. The talented Engineer of the Albany, N. Y., Gas-Light Co., adopts, in his flue setting of clay-threes, a width at the grate bars of 8 inches, splayed out to 16 inches at the surface of the fuel; while the Manhattan fives show a clear width of 12 and 18½ inches at these two points respectively. The latter is an open setting, and in both the retorts are 20″ × 12″ × 8′ 6.″ In resetting a stack of threes, at the Savannah, Geo., Gas Works, it is in contemplation to construct the furnaces with a width of 12 inches at the bars, splayed out by bevel-blocks to 20 inches, the distance from the face of the bench to the back wall of the furnace being 54 inches. In the latter case, however, the retorts are to be 24 × 13 inches inside, and 8 feet 6 inches long over all, embodying an attempt to utilize the large amount of room which is otherwise wasted in such arches as have a clear width of 6 feet 6 inches. The use of fire clay facilitates the use of wide retorts, regarding the comparative advantage of which, two opinions can hardly exist. The distillation of coals in a thin stratum, at high heats, and on short periods may be accomplished by them, and the increase per retort in labor and fuel accounts is not commensurate with the improvement in yield of gas per retort and per ton. In case of emergency, by sacrificing a couple of hundred feet per ton, a clay retort of large horizontal surface, can be driven to a per diem capacity such as is utterly unattainable by the ordinary sizes, and worked continuously at a glittering intensity of heat to which an iron retort could not with impunity be subjected for 24 hours. The putting on a lid in the use of large retorts, requires considerable expedition, especially when the shovel is employed for introducing the charge: and the hissing jets of flame are as unpleasantly active as where rosin is admixed with coal. In order to accelerate the tightening of the lid, it is advisable to employ cottars having a quarter-inch square thread. Screws of one-eighth inch have been more generally employed, but the one here recommended feeds faster and is more durable.

In regard to *serving* cottars: in regard to my own practice, I adopt them by preference, finding that the constantly throwing down of the ordinary shifting bars, not only acts to the rapid destruction of the thread, but also wears away the brick pavement in front of the bench. The stoker also knows where the cottar is always to be found, and loses no time in adjusting it to the centre of the lid. Even in benches of fives they are used to advantage; the cottars of the two lower retorts swinging *under-handed*, and having sufficient play in the eye to clear and rest upon the set-pins of the bottom retorts in the adjacent benches. The question, however, is not one of much importance, and hardly warrants the digression which it has induced.

In observing the action of the furnace, an apparently trivial fact possesses very considerable intrinsic importance, viz.: the eating away of the jamb, at the level of the grate-bars. It is here that combustion is most intense, and precisely here that its action involves the most grave consequences in the early destruction of the door-frame, and the contracting of the duration of the setting to a comparatively brief limit. Great permanence may be obtained at this point by giving the 9-inch jamb a footing of five or six inches into the furnace, which footing is to be worked in by two or three courses to nothing. A remark is here necessary regarding the construction of the door, door-frame, and breaking-down bar, and that remark need not be an amplified discussion of various methods, but rather a mention of the one which experience pronounces the best. In brief, the appendages patented by Paul A. Sabbaton, Esq., of the Albany, N. Y., Gas-Works, are indispensable in working clay, and advisable in the use of iron, retorts: a strong assertion, but a disinterested one, and one whose truth has been established by the unimpeachable test of practice. The features and advantages of Mr. Sabbaton's improvements have been so fully presented and so widely circulated in the lithographs and certificates issued by the Messrs. Elliman, as to preclude the necessity of specific eulogy of their merits here.

The advantages of splayed furnaces are two-fold in their character. They secure, by affording increased relative fuel surface, a completeness of combustion which ensures the maximum efficiency of the fuel employed; and the haunches of the furnace, by keeping the inflowing current of air in the central portion of the mass of fuel, and clear of the vertical walls, prevent the speedy destruction of the latter which occurs where they rise vertically and continuously from the grate. And in this connection it may be observed that where the flame ascends directly from the furnace and passes easily into the arch from beneath the top retort, much permanence is secured to the side walls or the furnace. In some settings of clay retorts, and, it is believed, in all settings of iron threes, the flame is deflected from its natural upward direction

through side ports into flues which traverse the bottom of the lower retorts. As a direct and necessary result, a cutting action at once occurs at these side ports, and speedily vitiates, in an accelerating ratio, the form of the furnace and the durability of the whole setting. Now, where iron retorts are used, this feature is hardly objectionable, as the furnace becomes gradually assimilated to the most efficient form, and the destruction of the setting is not so rapid as to shorten the 12-month's life of the retorts. But when a setting is to last two years and nine months, which is, I believe, the maximum recorded duration of clay retorts in American practice, these objections to side ports assume a magnitude which will, ere long, operate to consign the method to the tomb of the Capulets. I am aware that I run counter to high authority in this matter, but from an experience of some years in the use of clay retorts, am none the less assured that my position is demonstrably correct. It cannot be expected that a writer on points of practical doctrine will merge his personal identity in the *dicta* of others, and if his impressions and the details of his practice possess novelty, their exposition is but the more necessary to the determination of what is generally the middle line of truth. I may here observe that I am in no way desirous of screening myself from comment by the adoption of an anonym, but shall on the contrary be gratified if this series of papers shall serve to elicit criticism and discussion of the varied minutiæ which go make up the aggregate of successful gas-management.

When the ash pan sets below the floor, it is well to widen the snout as it recedes from the bench and rises to the floor, as this device is found to operate practically to more perfect and rapid combustion, by increasing the flow of air to the grate-bars. When benches are set back to back it is not of so much importance, nor indeed in the case of threes, but where a single stack of fives is employed, no means are to be neglected which tend, as this does to render the heat more intense or more equable. In any case the plan is found advantageous.

An adaptation of Mr. George Lowe's setting of clay fives has been generally adopted in this country, and the following remarks upon its features are quoted from a letter by Jos. A. Sabatton, Esq., Engineer Manhattan G. L. Co., to Mr. Theodore W. Parmelee, of New York city. This letter has been published in pamphlet form and is a valuable contribution to our knowledge of clay retorts, as embodying an unvarnished and dispassionately written account of their results and peculiar treatment in the largest of American Gas Works :—

"In placing a bench of five retorts I have adopted the "open setting, with return flues underneath the bottom "retort. The furnace is open at the top, the flame pass- "ing to the oven through spaces left between the bottom "and middle retorts, and between the middle and top "retorts, so descending to the bottom flue. The retorts "are supported one by the other, resting on bridge tiles, "the intervening spaces serving for the passage of flame "from the furnace.

"This plan of setting induces an even temperature "throughout the oven, each retort being capable of re- "ceiving a like charge of coal. When in good condition "a retort will carbonize 230 pounds of coal in 5 hours, "the dimensions of the retort being 8 feet 7 inches long "outside, 20 inches by 12 inches inside measurement, "and of the ordinary D shaped pattern."

This setting possesses the essentials of economy in first cost, uniformity of heat, and simplicity of arrangement, and furnishes an equally simple and efficient setting of threes, if we remove the two middle retorts and their supporting tiles. But one objection attaches to its use, and even that one possesses a somewhat dubious force: the fact that the two bottom retorts support the weight of the three upper ones. This may be avoided with but slight increase of cost by supporting the upper retort (in the case of threes) upon piers carried up from arch-blocks spanning the furnace. This plan is adopted in setting the large threes at the Savannah Works, while in all other respects the setting is modelled after the Manhattan fives, if we except the enormous width of furnace. In other words, the policy of protecting the retorts by 2 inch slabs is acquiesced in, and the direction of the flame is preserved. Mr. Sabbaton at first employed 1½ inch tile, but considers them too thin to stand, and finds greater uniformity of heat to result from the adoption of a tile of the former thickness in what is, after all a very open setting.

Notwithstanding what has been said of the expediency of open settings, a tribute is due, in candor, to what is known as the Albany flue setting of threes. The writer has recently discontinued a bench set on this plan, which had worked at a white heat for nearly fourteen months, carbonizing 700 lbs. coal to the five hour charge, and delivering the coke in flameless, incandescent lumps such as are most goodly to the gas-maker's eye. The bench would probably have lasted *twice* fourteen months but for the destruction of the furnace and door-frame, and (low be it whispered) a trial which was made of the device for removing carbon recommended by that most practical of jokers, A. Mellor, "of Leighton Buzzard." England. The decision reached by this trial is that, while water is a very good thing in its way, the inside of a clay retort at a white heat, is not exactly the place for it. As to the removal of carbon, more will be said anon, which will afford fresh proof that there is nothing new under the sun.

It has been remarked in some works, that in using the Albany setting, the heat seems to hang in the return flue under the top retort, while the oven shows a somewhat lower temperature. This will not occur in an arch of 6 feet 6 inches span, if the bottom retorts be set well, close to the side of the bench, and if the nostrils under the top retort be of sufficient size.

In setting clay retorts, the main features to be obtained are :

1. A wide, splayed furnace, with ample supply of air to the grate-bars.

2. Flues, passages, and nostrils of larger cross area than where iron retorts are used.

3. Small escape-flues, and straight, uptake flues.

The observance of these will in most cases insure intense and uniform heats, while their specific mode of combination will be decided by the personal opinions and experience of the engineer.

A clay retort must be carefully set to its place, the bed (or layer of "poor-stuff" on which it rests) being one-half or three-quarters of an inch in thickness, and made to conform as nearly as possible to any inequalities in the bottom of the retort. The retort should properly be one and a half inches less in length than breadth of the bench, thus bringing the outer face of the mouth-piece flauch flush with the face of the bench. The retort should be freely plastered over on its back end with stiff fire-mortar, and when it has entered to within a few inches of its place, the flat bars and rollers, slings and derrick should be removed, and the retort driven *hard home* against the back wall by means of a jack screw, such as can be obtained at any hardware store for four or five dollars. And where retorts have been accidentally supplied of less length, the work behind them should be accurately and solidly carried up, and the retort driven hard against it, as in the other case.

Among the peculiar properties of fire clay is that of contractility under permanently high temperatures, and upon this the Wedgewood pyrometer depends for its action. Worthless, practically, as this pyrometer is found to be, owing to the varying structure of the small fire-clay cones employed, it is yet not without its meaning to the gas-maker; and this acknowledged contraction, small though it be, renders but the more imperative the firm support at the back which the fragility of the material demands. Proofs of the necessity of thus bricking up any space which may occur between the retort and the back wall of the bench, are sufficiently numerous to warrant an iterated stress upon its importance.

As a means of reducing the loss of heat by radiation from the front of the bench, a 9-inch wall is necessary; and even thus confined, the heat thrown out by a well-set bench of clays is sufficient to render the retort-house in the vicinity uncomfortably warm. Having thus discussed the setting of clay retorts, a few words regarding the mouth-pieces and connections are appropriate before speaking of the heating, working, and peculiar advantages of clay retorts.

Visit to the Northern Liberties Gas-Works to witness the Burning of Water-Gas.

On Wednesday evening a number of citizens, by invitation, visited the Northern Liberties Gas-Works, to witness the progress of the efforts made to cheapen the price of gas to consumers by means of the water-gas, patented by Dr. J. Milton Sanders. On arriving at the works, they were found to be entirely lighted by the unmixed Sanders's water gas, and there was but one expression as to the beauty and quality of the light. After passing the Company's offices, which were brilliantly illuminated by the same gas, the visitors passed into the house where is erected a bench of three small retorts one-third of the capacity of the ordinary coal retorts used at the same factory. Here the light was found in all its brilliancy, and the mode of making the gas was shown and explained. The details need not be described. It will be sufficient to say on this point that the apparatus is exceedingly simple. Steam is supplied by a small boiler, and this is connected at the proper point with the hydrocarbon (rosin is the substance now used), and carried together into the retort filled with incandesent charcoal. And there was but one expression as to the quality of the gas that was produced, or as to the beauty, simplicity, and economy of the working. Of one thing visitors were satisfied, that water will burn. The proof was given beyond the possibility of a doubt. As to the economy of the process the public will learn more hereafter. It is certain, however, that retorts one-third of the size of coal retorts will produce a much larger amount of gas.

The parties interested in the water-gas contend, and it is supposed with reason, that the cost of gas-making can be reduced materially by the process of Sanders. They supplied the visitors with information on this subject, but prefer that the cost shall be fully tested before there shall be any positive decision on this point. It is within bounds, they think, to claim that the cost will not exceed thirty seven cents per thousand feet for raw materials. This is an important deduction, and yet it is possible that it may be still farther reduced. With respect to the odor of the gas, there can be no fault found. It is more agreeable than that of coal gas, and the gas-works at Wilmington must have been well filled with sulphur when the water-gas passed through the purifiers there, to cause the slander that has been put in circulation on that subject. Altogether, the visitors to the Northern Liberties Gas-Works on Wednesday evening were more than repaid for their their trouble in visiting the premises. They saw the beginning of a revolution in the people's gas bills, in which all housekeepers will wish to take part. The Girard House, and several factories in the neighborhood of this city, will introduce it, their proprietors having full confidence in what has been so clearly demonstrated.—

From the *Pennsylvania Inquirer*, Feb. 17th.

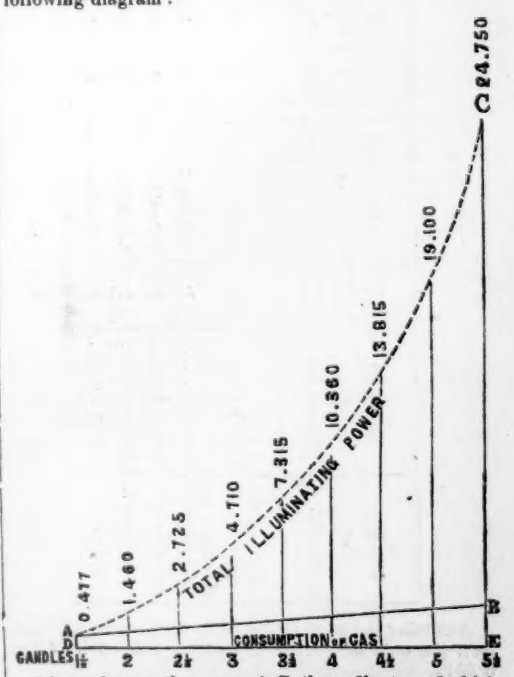
THE OXY-HYDROGEN LIME-LIGHT.

Sir,—The prospectus of the "Universal Lime-Light Company" having attracted considerable attention from the general public, and awakened especially the interest of proprietors in gas companies, who feared that their investments would be jeopardized by an invention which would insure light at half the cost of coal gas, I have taken some trouble to investigate the statements which have been put forward by the promoters of the company.

You have already, in the last number of your Journal, exposed the fallacy of comparing gas-lights, not exceeding twenty candles, with lime-lights of from 758 to 1197 candle power. In reality, all illuminating power (except, perhaps, in the case of the electric light) is conferred by solid bodies in a state of incandescence, which is more or less brilliant, as the temperature is higher or lower. All know that the amount of light given by a gas flame, properly burned, increases in a ratio much larger than that of the consumption of gas. I have frequently illustrated this principle by the following very simple experiment :— If two batswing or fishtail burners are placed within an inch of each other, with both their flames perpendicular, a certain quantity of light will be given. If the two burners are then slightly inclined inwards, so that the two flames may impinge on each other the amount of light will be so much greater, that the increase will be plainly discernible to the eye of the observer, without the use of any photometer or shadow test. The reason of this is quite obvious. The two flames, when separated, expose four flat surfaces to the cold air, while, after their union, little more than two surfaces are exposed to the same cooling influence. From many experiments, which all agree in proving this principle, I select the following one, of Mr. Alfred King's, on the consumption and light-giving power of "Wingfield's lucent" argand burner :—

Feet of Wigan Cannel Gas.	1½	2	2½	3	3½	4	4½	5	5½
Consumption per hour—cubic feet...	1·5	2·	2·5	3·	3·5	4·	4·5	5·	5·5
1 foot — candles	0·318	0·73	1·00	1·07	2·09	2·	3·07	3·82	4·5
1 foot — grains of sperm....	38·2	87·5	131·8	188·4	251·1	311·3	368·9	458·8	540·0
Total quantity of light given in wax candles	·477	1·460	2·725	4·710	7·315	10·300	13·815	19·100	24·750

The operation of the principle is represented by the following diagram :



I have drawn the curve A C, the ordinates of which, measured to the horizontal line D E, represent the quantites of light given at the different rates of consumption, which rates are represented by the portions

of the same ordinates intercepted between the two right lines, A B and D E. Thus, while the consumption of gas has increased only in the proportion of the line B E to A D, the amount of light has been magnified in the ratio of C E to A D.

It is unnecessary to say that, if the quantities of light increased in only the same ratio as the consumption of gas, the line A C would coincide with the line A B. This graphical delineation of the law represents its operation in a very striking manner. There is no doubt but that the lime-light is subject to a law of similar character—indeed, the promoters themselves say that it "is found to vary in power in a much higher ratio than that of the consumption of the gases;" and I have reason to believe that the difference between the illuminating power and the consumption is much greater than in the case of coal gas.

This law leads to the conclusion that, if the gas-lights were increased to the same power as the lime-light, or the lime-light diminished to the same standard as the gas, common coal gas, instead of being dearer, would be found five, and, under ordinary circumstances, twenty times as cheap as the lime-light. This observation applies with still greater force to cannel gas.

Before I leave the subject, I cannot help remarking upon the very anomalous statements of Professor Gardner's table, with respect to the light given by two fish-tail burners, one of which, consuming less than 2½ feet per hour, gave a light of 7 candles, while another, burning 5 feet per hour or more than twice as much, gave a light of only 6 2/3rds candles. If Professor Gardner chooses to burn good coal gas in such a way that 5 feet per hour shall give less light than 7 wax candles, he can easily prove anything he pleases with regard to the comparative economy of the lime-light. If it were not an intrusion, I should be happy to communicate to him a mode in which he can burn the same quantity, so as to give less light than a single dip candle, and he can then make use of the experiment for his table of comparative cost with greater effect. I shall, therefore, dismiss the consideration of these statements, and confine myself altogether to the reported experiment with an argand burner, in which the gas had an illuminating power of 15·52 wax candles per 5 cubic feet; being very nearly the quality of gas usually supplied to the public.

It is remarkable that, although Mr. Renton's report, with the greatest nicety, calculates the cost of the lime, being a matter involving the 33rd part of a penny per hour, there is no statement of the price at which either oxygen or hydrogen can be produced or supplied. This minute accuracy about an item which is only 1/396th of the whole cost, while the 395 parts are allowed to take care of themselves, is even an exaggeration of the "penny-wise and-pound-foolish" proverb, and is, at the least, suspicious. In justice to Mr. Renton, however, I must say that, at p. 13 of his report, he tells us that the cost of oxygen "will be merely nominal." I will give your readers some means of judging what Mr. Renton deems to be a "merely nominal" cost.

Now, Sir, although the cost of each of these gases is not directly given in Mr. Renton's report, I have been able, from his table (part of which I here repeat) to show what the prices of these gases must be. Supposing the price of ordinary coal gas to be 4s. 6d. per 1000 cubic feet, and, in every other item adopting the figures of the table itself, I now proceed to give the steps by which I have discovered these prices. Although the calculation might be given more shortly in an algebraical form, still I think it better, for the many practical men, who are readers of your JOURNAL, to give the several steps of the calculation in common arithmetic:—

Description of Material.	Particulars of Burners, &c.	Value in Wax Candles, Six to the Pound.	Consumption of Material per Hour.	Units of Cost.	Cost per Hour for Light of equal Intensity.
			Ft.		d.
Lime light, with coal gas	Jet, 1-16 in. diam.	758·	7·2 oxy., 7·8 gas ...	9	1·00
Lime light, with hydrogen	Ditto, ditto	1167·	6·53 oxy., 12·4 hyd.	10	1·11
Argand gas-light	Ditto, 15 holes....	20·18	6·50 cubic feet	17	1·88
Fishtail ditto ...	Ditto, No. 1	7·00	2.41 ditto.....	18	2·00
Ditto ditto.....	Ditto, No. 4	6·66	5·00 ditto.....	40	4·44

Assuming the price of gas to be 4s. 6d. per 1000 cubic feet, the cost of burner consuming 6·5 cubic feet = 0·351d.

(1.) 1000 : 6·5 :: 54d. : 0·351d.

This gives a light equal to 20·18 candles. Therefore, the cost per candle per hour is=0·0174d.

(2.) 20·18 : 1 :: ·351d. : 0·0174d.

Now, the cost of the lime-light, with oxygen and coal gas, is stated to be less than that of coal gas alone, in the ratio of 9 to 17. Therefore, the cost per candle per hour is 0·00921d,

(3.) 17 : 9 :: 0·0174d. : 0·00921d.

This gives a light equal to 758 candles, and, therefore, costs 6·98118d.

(4.) 1 : 758 :: 0·00921 : 6·98118d.

Now, this burned 7·8 feet of coal gas, which cost 0·4212d.

(5.) 1000 : 7·8 :: 54d. : 0·4212d.

In (4) we found the cost of lime-light, with oxygen, to be 6·98118d. per hour. Therefore, deducting 0·03d., being the cost of the lime, and 0·4212d., being the cost of the coal gas, as we have found in (5), we get the cost of the oxygen consumed to be 6·52998d.

(6.) 6.98118—(0·03+0·4212)=6·52998d.

There was burned here 7·2 feet oxygen, which thus cost 6·52998d. Therefore the cost of oxygen per foot is 0·90674d., or £3. 15s. 7d. per 1000 cubic feet!!!

(7.) 7·2 : 1 :: 6·52998 : 0·90674d.

Thus we find, from the promoters' own statement, the cost of oxygen gas to be £3. 15s. 7d. per 1000 cubic feet—a price which Mr. Renton considers to be "*merely nominal.*"

I will now apply the same method to the statement regarding the light=1167 candles produced by oxygen and hydrogen. The cost of the lime-light produced by hydrogen and oxygen is in the proportion of 10 to 9 to the cost of lime-light produced by oxygen and coal gas. I have already shown (3) that the cost with oxygen and coal gas = ·00921d. per candle per hour. Therefore, the cost of lime-light produced by oxygen and hydrogen is 0·01023d. per candle per hour.

(8.) 9 : 10 :: 0·00921d. : 0·01023d.

This gave a light equal to 1167 candles. Therefore, the total cost is 11·93841d.

(9.) 1 : 1167 :: 0·01023d. : 11·93841d.

This burned 6·53 feet of oxygen; and I have already shown in (7) price of oxygen to be 0·90674d. per cubic foot. Therefore, 6·53 feet cost 5·922318d.

(10.) 1 : 6·53 :: 0·90674d. : 5·922318d.

Total cost of light (9) is 11·93841d. Therefore, deducting ·03d. for lime, and 5·922318d. for oxygen, we get cost of hydrogen employed to be 5·9860918d.

(11.) 11·93841—(·03+5·922318d.)=5·9860918d.

In this experiment there was burned 12·4 feet of hydrogen, which cost 5·9860918d. Therefore, cost of hydrogen per 1000 cubic feet, is £2. 0s. 2d.!!!

(12.) 12·4 : 1000 :: 5·9860918d. : 482·81d.

This is a price which Mr. Renton says, "will leave the cost of the gas in *favorable contrast* with other gases, which may be employed for the purpose."

I must observe, that the oxygen and hydrogen gases should be distributed by separate mains, as, when mixed in the proportion necessary for the lime-light (viz., 2 volumes of hydrogen to 1 of oxygen), they form one of the most dangerous compounds which the whole arsenal of explosive chemistry can boast of.

I will leave it to your practical readers to consider what would be the cost of distributing, under considerable pressure, to gases, the price of one of which is shown by the patentees themselve to be £3. 15s. 7d., and that of the other to be £2. 0s. 2d. per 1000 cubic feet, as contrasted with coal gas, which certainly should not cost the manufacture 2s for the same quantity. The comparative leakage of products, the value of one of which is twenty, and the other is nearly forty times the cost of coal gas, would become a serious question with the practical engineer.

But, if we base our calculations upon the cost and illuminating power of cannel gas, it can be shown that the light from this source, even when burned at the low rate of 5 cubic feet per light per hour, is as cheap as the patentees themselves assert the lime-light to be. Cannel gas is now supplied in Liverpool (without competition, by a company which pays a dividend of 10 per cent.) at the low price of 3s. 9d. per 1000 cubic feet; 5 feet of this gas gives a light equal to 24 *sperm* candles, and costs 0·225. The cost per candle per hour is, therefore, 0·0093d.; while the cost of the oxyhydrogen lime-light, as alleged by the promoters themselves, is (8) 0·0102d. per *wax* candle per hour. Making an allowance for the superiority of *sperm* to *wax*, we may put down the cost of cannel gas to be about 0·0080d. per *wax* candle per hour, which is thus much cheaper than the vaunted lime-light, although the intensities of the lights, compared with each other, are in the ratio of 24 to 1167 candles, or 1 to 50.

Though the promoters of the company have thus set down the price of oxygen gas at £3. 15s. 7d. per 1000 cubic feet, the following passage from Mr. Renton's report would seem to imply this is a gross under estimate:—

"The chlorate of potassia is a substance which, though costly at first hand, is, nevertheless, a valuable material for the production of oxygen gas, from the facility which it affords to the operation. The comparatively low temperature required for its disengagement, and the rapidity with which it is produced, requires less attention and labor. Hence the cost of the gas is not so great as would, at first sight, appear, when contrasted with that from manganese. The residuum is chloride of potassium, or familiarly, muriate of potash, and is used in the arts."

The plain inference from this passage is, that oxygen produced from chlorate of potash, cannot be very much dearer than from peroxide of manganese.

The present wholesale market price for chlorate of potash, bought in large quantities, is 1s. per lb. Berzelius has shown that one grain of chlorate of potash produces 0·3915 grains of oxygen, equal to 1·151 cubic inches; therefore, 1lb. of chlorate of potash produces (1·51 × 7000)=8057 cubic inches.

8057 : 1728 :: 12d. : 2·648d.

Here the mere cost of chlorate of potash, for 1000 cubic feet of oxygen, without counting fuel or labor, &c., is £11. 0s. 8d. (!!!) The residual product, chloride of potassium, being only employed in the manufacture of so cheap a salt as alum, and being abundantly supplied as a refuse of the soap manufacture, as "soap boilers' waste," is of little commercial value, and would become of still less if produced in larger quantities.

As far as Prosser's and Bastable's patents have yet been disclosed, they really amount to no more than an alleged improvement in what may be called the *wick-holder* of the lime light. Whether the specification, not yet due, contains any more important invention, I cannot, of course, say; but, if it does not, I cannot but admire the modesty of the gentlemen who, unblushingly, ask £60,000 for a contrivance which can easily be equalled without any infringement of their patent, and which, perhaps is not superior to the unprotected methods long employed for the same purpose. If the ingenious contrivance of two little tubes, connected by three little wires, is worth more than half a "plum," it cannot be said that the inventors of the present day live in an unappreciating age.

DENNY LANE.

Cork Gas Consumers' Company's Offices,
72, South Mall, Cork, Feb. 6, 1860.

THE AMERICAN LIME-LIGHT.

ROCHESTER, March 16th, 1860.

Editor AMERICAN GAS-LIGHT JOURNAL:

Your issue for this month contains a description, illustrated by a woodcut, of the latest improvement of the lime-light, patented in England. Are you aware that the latest similar improvement patented in this country is many steps in advance of the foreign one? Analyze for a moment the English improvement, abstracted from the complication of stop-cocks and tubes with which it is surrounded. What does the improvement consist of? The gradual supply of fresh lime, to supply the place of the lime disintegrated by the action of the oxyhydrogen jets? No; this was done long ago by clock-work. What then? Merely providing a case for the lime to slide through, so that when it is disintegrated, it need not fall off and interfere with the permanency or brilliancy of the flame. This is the sum and substance of the English invention. Turn now to the American invention. For many months a locomotive on the New York Central Railroad has carried for its head-light one of Dr. George Hand Smith's patent lime-lights; where the disintegration of the lime is so much prevented, that one piece of lime will last for several hours without being touched. The English invention guards against the evils arising from disintegration, and feeds on the lime by clock-work. The American invention *prevents* the disintegration, and has no need for any clock-work. Will not the old adage apply in this case, "An ounce of prevention is worth a pound of cure."

The American experiments have been much more fully developed than the English ones. The English experiments have reached thus far. The two gases are taken from gasometers, exerting a *slight uniform* pressure. Each one of the three jets has two stop-cocks, making six in all, and every time the lamp is lighted, *each one of these six stop-cocks must be adjusted*, to afford the proper flow of gas. When this is done a *stationary* light is produced. Now let us examine the extent to which the American experiments have been carried. The locomotive starts out with two small tanks, a foot in diameter and three feet long, into which the gases have been compressed till the gauge indicates seventy, eighty, or one hundred pounds pressure. While the train is in motion the fireman leaves the "cab," goes to the head of the engine, turns *one stop-cock* on *full head*, lights the gas, and returns to his regular duties, without stopping to see whether the mixed gases flow properly through the *four jets*. There is no clock-work here. One automatic regulator governs everything, while the pressure in the gas tanks diminishes indefinitely from its maximum. To the uninitiated the transition from gas-holders, exercising a pressure of a few ounces, to gas-holders exercising a pressure of many pounds, may seem simple; but I can assure them from experience that it is an extremely difficult matter to feed uniformly an *elastic* fluid of light tension from an elastic fluid condensed into *great* tension.

In the English experiments the tubes and platina wire

surrounding the lime radiator, cut off a considerable portion of the light, and also conduct off the heat to an injurious extent. In the American experiment there is no metal near the lime radiator, and its *top* is a globe of fire, giving a much greater radiating surface than in the English experiments.

Is the time far distant when the soft *white* light of the incandescent lime shall assert its supremacy over the harsh yellow light of coal gas, if not for all purposes of illumination, at least in churches, halls and theatres?

J. W. S.

SUIT AGAINST A GAS-LIGHT COMPANY.

SUPREME COURT—GENERAL TERM. *Feb.* 23, 1860. *Important motion.*

The People agst. James Bowen and others (the Metropolitan Gas Company.)—This was a motion on the part of the defendants to dismiss an appeal taken by the plaintiffs (the People) from the judgment at Special term. It appeared that the suit was brought in 1855, by the Attorney-General, to determine as to the validity and constitutionality of the defendants' charter. The Attorney-General authorized Monell, Willard & Anderson, attorneys of this city, to appear for the People, and to conduct the proceedings on their behalf. Very little seems to have been done until March, 1859, when a singular attempt was made to procure the discontinuance of the suit by Attorney-General Tremain, but which he refused. In May the case was tried, and decided in July in favor of the defendants, from which the plaintiffs appealed to the General Term. The motion to dismiss was founded in part on a letter written by S. K. Hammond, deputy Attorney-General, to Messrs. Monell, Willard & Howe, the plaintiffs' attorneys on the 8th of August, 1859, in which he says, "that it was the understanding of the Attorney-General, at the time his consent was given to continue the suit, that if the decision at special term was in favor of the defendants, the proceeding should be discontinued," and directing the appeal to be dismissed; and in part upon a consent signed by the same deputy Attorney-General, under date of December 19, 1859, to the dismissal of the appeal, in which he says, the appeal was taken without the Attorney-General's authority.

In opposition to the motion, an affidavit of C. L. Monell, one of the plaintiffs' attorneys, was read, stating that after the letter of deputy Attorney General Hammond, of the 8th of August, had been sent and received, the attorneys received another letter from him, dated August 16, 1859, in which he says: "The letter addressed to you on the 8th instant, in reference to this suit, was written under a misapprehension, and I wish to withdraw it. Will you be kind enough, therefore, to return the same to me by return mail." That the original letter was accordingly returned, and nothing further transpired until the consent of December, which was obtained without notice to the plaintiffs' attorneys, and without their knowledge. Upon receiving the motion papers, Mr. Monell addressed a note to the late Attorney-General Tremain, informing him of the consent and the motion founded upon it; and in reply, Mr. Tremain says: "No consent was ever authorized by me to the discontinuance of the appeal in that action, nor was the paper, of which you enclose a copy, executed by my authority or consent. On the other hand, I had declined to give any stipulation to that effect upon application. I had no knowledge that any such consent had been given, until since the expiration of my office as Attorney-General, when my late deputy informed me that, during my absence from the city, he had given such a stipulation." Mr. Waldo Hutchins, for the motion, contended that the appeal brought by the attorneys of record was without the authority of the Attorney-General; that upon being notified that an appeal had been taken, he apprized the attorneys that the understanding was, that if the defendants were successful at Special Term, the suit was to stop there, and directing the appeal to be discontinued; and that subsequently, in December, he had, through his deputy, given a written consent to the dismissal of the appeal. He denied that the Attorney-General could substitute or appoint attorneys for the people, and that he alone could appear on the record. He further said that the letter of the Attorney-General, that the consent to dismiss the appeal, was given without his authority; did not affect the matter, as the deputy was empowered by statute to act in the absence of the Attorney-General.

Mr. Evarts, in reply, said, the action was one described in section 430 of the code, where, on leave of the Court being granted and indemnity given, it became the duty of the Attorney-General to bring the action, and should he decline to continue the action, he would be amenable to process of mandamus. Now, how did they stand before the Court? The only attorneys of record in the suit were the attorneys in whose name the action was instituted, in whose name it was prosecuted, in whose name the consents and arrangements with the opposing attorneys were made, in whose name the appeal was taken, and in whose name it now stood on the calendar of the Court. And the defendants had given their notice of this motion, not to the Attorney-General, so far as appeared, but to the attorneys representing the people on record. It was unnecessary for him to say that upon the record of this Court they stood as by the authority and appointment of the Attorney-General; and there was no law, no precedent, no rule that prevented the people being represented, in an action in their courts, by private attorneys. So far, then, as any question was raised that the Attorney-General had not authorized the attorneys of record to appear, or that such appointment was irregular and invalid, his motion did not touch that question. Would the Court dismiss the appeal on either of the two letters produced by the moving party? Would they dismiss it on the letter of the 8th of August, which formed part of the moving papers? That paper, it was not too strong language to say, upon the correspondence and facts given in the affidavits, read to the court was a fraudulent re-issue from the Attorney General's office of a paper, the original of which had been withdrawn, returned and cancelled. Did the learned counsel stand upon that paper? He presented it as the foundation of his motion, as showing that, on notice to the Attorney-General's office, an appeal had been taken in the name of the people by the attorneys of record. On the 8th of August, the deputy Attorney-General wrote to discontinue the appeal They replied that Mr. Monell was out of the city, and on his return would write. Within eight days, and without any further intervention, without any inquiry or consultation, there came a direct letter from the Attorney-General, signed by the same deputy, saying to Mr. Monell that the former letter (of the 8th) was sent under a "misapprehension" of the matter. A misapprehension of what matter? Why, that the action was not to be prosecuted after the decision of the Special Term. Did the Attorney-General revoke or annul that? No; but desired to cancel it, to obliterate the evidence of the fact that any such misconception or misconduct had occurred. How had the learned counsel got that letter out of the Attorney-General's office, which had been returned, cancelled and revoked? This fact was the strongest commentary upon the subsequent act of the deputy Attorney-General in consenting to the dismissal of the appeal, without the knowledge of the Attorney-General. To say that this appeal was not taken by his authority and assent, after the attorneys of record advised the Attorney-General that an appeal was taken—after the letter written by the deputy on the 8th, directing a discontinuance, was, on the mere motion of the Attorney-General's office, in a few days afterwards withdrawn, as written under a misapprehension! How idle to say, after that, that the appeal was taken, and that the Attorney-General did not approve of it. He (Mr. E) knew of no more distinct, no more complete, no more thorough approval of the conduct of the suit, in the name of these attorneys, than that which was given, first, by the mistaken interference, and second by the prompt withdrawal of any such interference. He further contended that Attorney-General Tremain, having gone out of office, and the consent not having been used or acted upon during his term, could not now be made the foundation of this motion.

The Court denied the motion to dismiss the appeal.

ANNUAL REPORTS OF GAS COMPANIES.

MILWAUKIE, WIS., GAS-LIGHT CO.

We have been favored with the Report of Mr. E. Irons, Sec., to Dec. 31, 1859, very creditably drawn up, brief, comprehensive and quite satisfactory to the stockholders.

Length of main pipes, ...	17 miles,	increase, 2 miles,
Number of consumers,	1,334,	" 70
Number of street lamps,	306,	" 55

Number of Retorts in operation, 56.

[Why not state how many clay and how many iron?—ED.]

Coal carbonized in 1859.....	5.742,200	lbs.
Gas produced.....	22,589.200	c. f.
Average yield.	3 93	c. f. per lb.
Gas consumed by private meters.	15,221,600	c. f.
" Public Lamps, Engine Houses, &c.....	2,824.241	c. f.

Showing a deficiency of 20½ per cent., *of which only 7½ per cent. is actual wastage*, the balance being by condensation, consumption at works and office, and for charging the new gas-holder.

Mr. Irons adds that owing to the dull times, the consumption of gas and general receipts are not proportionately as large as in 1858, yet, by economy of expenditure, particularly in the purchase of coal, the new year has, in fact, found the Company in much better condition financially, than any of its predecessors.

CASH ACCOUNT.

Dr.

To Receipts for Gas.....	$60,247 15	
" Rent of Meters and Lamp Posts....	5,112 29	
" Lighting and Extinguishing Lamps.....	820 75	
" Sales of Coke.....	1,806 97	
" " Tar.....	327 63	
" " Old Tiles, &c.....	665 37	
		$68,980 16

Cr.

By Wages	$7.755 68	
" Cost of Coal.....	16,109 59	
" " Lime.....	637 14	
" Expenses, interest, taxes, and materials....	18,873 78	
" Balance.....	30,603 97	
		$68,980 16

After paying the sum of $25,385 for dividends for the year 1859, the sum of $8,857 30 was carried to the credit of the sinking fund.

Amount of capital stock issued	$259,650
Amount of 7 per cent. Bonds outstanding	61,500

NEWPORT, R. I., GAS-LIGHT CO.

The capital stock of this Company has been increased one hundred shares, so that its capital is now $130,200.

The Mains have been extended 1,350 feet during the year, but the total length of mains is not stated.

New consumers added during the year, 48, but the total number is not stated.

Rent is now charged on all meters where the consumption is less than 1,500 feet in six months, but what rent is charged is not stated.

CASH ACCOUNT.

Dr.

To Receipts for Gas....	$21,307 60	
" " Coke.....	730 48	
" " Tar.....	77 28	
" " other sources..	996 78	
		$23,112 14

Cr.

By cost of Coal, Labor, and Lime	$5,683 39	
" Salaries, interest, taxes, &c.	3,704 66	
" Balance.....	13,724 09	
		$23,112 14

The Company have on hand, in Coal, Lime, Coke, Pipe. Mains, unpaid bills and cash, the value of	$11,641 19
Their liabilities are	5,169 34
Leaving a balance in favor of the Company of	$6,471 85

The Report is signed by Henry Bull, President, and John H. Cozzens, Sec., and is very creditable to them. We would like a little more amplitude in aggregates, however.

When in Newport, last summer, we visited their Works, and were struck with the neatness, order and thriftiness that were apparent throughout.

ALEXANDRIA, VA., GAS-LIGHT CO.

Messrs George Bryan, Benjamin H. Lambert, James S. Hallowell, and D. R. Blacklock, the Committee on Light, have laid before us their annual report to February 24, 1860. It will be remembered that these are city works.

Main pipe laid during the year, 2126 feet.

Total mains now in use, 9 miles, less 96 feet.

Meters set, 44; total registered, 818.

Gas made from Dec. 15, 1858, to Dec. 1859,		7,582,330 c. f.
" sold to consumers, . .	5,588.475	
" used by 103 public lamps,	1,305,600	
" " at gas-works, . .	52.000	
" " by City Council, .	10,000	
		7.056.075
Loss by leakage and condensation about 7 per cent., being		526,255 c. f.

CASH ACCOUNT,

Dr.

To Gas sold to consumers,	$20,263 51	
" " " 95 st. lamps, at $30,	2,850 00	
" " " 8 market at $65,	520 00	
" " " City Council,	25 00	
" sales of Coke, Tar, Lime, &c.,	663 77	
		$24,322 28

Cr.

By cost of Coal, . . .	$4,833 29	
" " Retorts, . . .	495 00	
" " other Expenses, .	5,795 66	
" Balance, ...	13,198 33	
		$24,322 28

CONDITION OF THE GAS-WORKS.

Cost of Works to date, .	$118,453 08	
Corporation stock on hand, .	1,800 00	
Coal on hand, . . .	1,600 00	
Other assets enumerated, .	7,056 62	
		128,909 70
Due by the gas-works, ...		3,619 10
Balance to credit of the Works, . .		$125,290 60

The Report contains other details, interesting only to the parties on the spot. It is a remarkably clear and concise statement of their affairs, and we challenge any northern municipal committee to surpass it, whether in point of close business matter or economy of administration, even for works of the same size. The Committee recommend a discount of 10 per cent. on all gas bills paid within five days of presentation, insteadof 5 per cent. as at present.

COBOURG, C. W., GAS-LIGHT CO.

The Annual Report of this Company, to February 6, 1860, is before us, from which it appears that its affairs are somewhat embarrassed. In pursuance of a resolution of the stockholders the works have been leased for a period of five years to Mr. John Whitelow, on private terms.

CASH ACCOUNT.

Dr.

To Gas Account, . . .	$13,752 70	
" Coke, Meters and Rent, .	875 13	
		$14,627 83

Cr.

By Charges, ...	$8,507 00	
" Stock, ...	1.100 00	
" Balance, ...	5,020 83	
		$14,627 83

The assets exceed the liabilities by the sum of $1,141 75, and the estimate for the current year, 1860, shows a balance in favor of the revenue of $1,410 05. Mr. T. Scott is President, and A. McDonald, Secretary.

THE AMERICAN GAS-LIGHT JOURNAL
Represents the three important interests—
LIGHT, WATER, AND SEWERAGE.

Its purpose is to ascertain and make known all new discoveries in the science and economical application of GAS-LIGHTING, and promote thereby the interests of companies and of consumers; to encourage and aid the introduction of PURE WATER from Lakes and Rivers into Towns and Cities and to improve the system of SEWERAGE, VENTILATION, and DRAINAGE everywhere.

Incidentally with these results, the business of all Gas and Steam Fitters and Plumbers; the erection of Gas-Works and Water-Works; the consumption of Coals, the manufacture of Gas-Pipe, Water-Pipe, Steam-Pipe, Gas Fixtures, Gas-Meters, Water-Meters, Retorts of iron and clay, and their varied apparatus; of Drain Pipes, Ventilating, Heating and Dredging Machines, will be increased immeasurably

THERE ARE 20,000 CITIES AND TOWNS IN THE UNITED STATES, CAPABLE OF SUPPORTING GAS-WORKS, WHILE THERE ARE NOT 400 GAS-WORKS IN OPERATION IN THE WHOLE COUNTRY!!!

New works are now springing up, however, every week, and they will continue to increase rapidly hereafter.

Our Tables will present to the capitalist opportunities for desirable investments in the shares of sound and prosperous gas-light and water companies, paying liberal and regular dividends.

Advertisers of Gas, Water, Steam, Sewerage and Ventilating apparatus; of Iron and Brass manufactures, &c., will find the AMERICAN GAS-LIGHT JOURNAL the most desirable medium of any in the United States, going, as it does, direct to the parties concerned in those subjects.

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All new inventions relating to Light, Water, Steam and the Sanitary interests; all legal decisions affecting the rights of companies and consumers; all progressing and projected works; all experiments and plausible theories; in fine, every item of intelligence relating to its prominent *specialities*, will be found in the columns of the AMERICAN GAS-LIGHT JOURNAL.

There is no person living who has not a direct concern in these subjects, and it is by extending our subscription list to the utmost limits that the greatest benefit will result to all; to which end we solicit the kind offices of our friends and of communities.

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Ten copies of each *original communication*, published in the AMERICAN GAS-LIGHT JOURNAL, are, if requested, at the disposal of the author. Authors should specify at the head of their MSS., the number of extra copies desired; it is too late after the forms are broken up.

The titles of communications and the names of authors should be fully given. The articles intended for any number should be sent in, if possible, by the 15th of the month, or the pages may be preoccupied.

THE
AMERICAN GAS-LIGHT JOURNAL.
ISSUED MONTHLY.

MONDAY, APRIL 2, 1860.

The main feature of the month is the racy legislation on gas matters at Albany, the capital of the State of New York. In another column may be found the prominent sections of the Universal three-horse gas Act, introduced by Mr. POND, a respectable member from Monroe county, whose only excuse for so ridiculous a measure may perhaps be found in some personal pique against the gas-company in his district. The corporations of several cities protested against the monstrous propositions of this bill, which in short, authorises any three men to take any man's property with but an apology for a commission to estimate and award its value. The bill went to the Judiciary Committee who strangled it at one grip. Another bill, intended to tinker up the present gas-meter inspection Act, is still before the House. Whether it passes or not is immaterial to the world at large, and to the gas interest in particular.

Opposition gas-companies appear to be the order of the day, starting up as they do in various sections of the country. We hear of them already projected in Rochester, Syracuse and Utica in this State, and in New Haven, Connecticut. We like free trade and gas-consumers rights as well as anybody, but would recommend some of these enterprising geniuses to remember that,

"Fools rush in where angels fear to tread."

and some are now already reaping the consequences of their folly. The only successful attempt of the kind that we know of is in Charleston, S. C., where the bad gas and miserable works of the old company had rendered them unpopular. An organized company, with a million or more of capital, and in full possession of a district, is a formidable adversary to place on the defensive.

The contract for the large mains—forty-eight inches diameter—for the Croton Aqueduct Department, advertised in the last number of this JOURNAL, was given to the WARREN FOUNDRY, at Phillipsburg, N. J., they being the lowest bidder. The price at which it was taken is as follows: For four feet straight pipe $33 93 per ton; for curved pipe, and special castings connected therewith, $67 20 per ton; for curved pipe, and special castings connected with the 12 inch and 6 inch pipe, $44 80 per ton. This is asserted to be the lowest contract for similar purposes ever made by the Department. The four feet pipe is intended for an additional line across the High Bridge, the necessity of which has been so often and so loudly urged.

An admirable suggestion is made by SAMUEL R. BRICK, Esq., in this number of the JOURNAL, viz., to convene a CONGRESS OF GAS OFFICERS in October next, at the rooms of the AMERICAN GAS-LIGHT JOURNAL, for the purpose of making each other's personal acquaintance, interchanging views, and adopting such measures for mutual benefit as may be suggested. It is proposed to make the sessions of the Congress annual. There are many reasons why this should be done, and it is regarded with favor by all to whom it has been mentioned since the receipt of Mr. BRICK's letter. The gas-light interest requires centralization and protection, as much as any other interest, if not more so; and it is high time that some steps were taken to look after it. We shall give ample notice of the day that may be definitely fixed upon for the Congress, so that all who can, may arrange to be present.

The Lime-light has attracted a good deal of attention since our last issue, and we have had numerous inquiries as to its probable effect upon the gas-light interest. Until we can see something of its practical workings, we can scarcely form a reliable opinion, but notice that it was exhibited before the Society of Arts in London, on Wednesday evening, February 22, when Dr. LETHEBY, Dr. BACHHOFFNER, Mr. WILLIAM HAWES, Mr. G. F. WILSON, F.R.S., and Mr. W. E. NEWTON, joined in a discussion of its merits. The light was displayed from the top of a standard, about fifteen feet high, in a lantern containing five combined jets of coal gas and oxygen, playing upon five separate cylinders of lime. The light is said to have been brilliant, but painfully glaring to the eyes at that elevation, and while it threw the light from the gas chandelier quite into the shade when in full blaze, the coal-gas was welcomed again as much more agreeable, when the lime-light gave out. Dr. LETHEBY was thoroughly opposed to the lime-light, asserting that it would not only be ten or twelve times more costly than coal-gas, but would be dangerous to the eyes, for its intensity paralyzes the retina, as he himself had in a measure experienced. Another speaker prophesied that before long a ready means of decomposing water would be discovered, and that we should feed our fires with water instead of coal! This announcement will be hailed by the SANDERS' water-gas philosophers of Philadelphia. The most determined advocate of the lime-light present was Mr. WILLIAM HAWES, who appears to have stood by his guns to the last. He denounced, with propriety too, the assertions of scientific men, that a thing could not be done because they could not do it, and his argument that the same objections now urged against lime-light, might have been advanced forty years ago against coal-gas, was well put.

We refer readers to an article on the American Lime-light in this number, from the pen of J. W. SPRAGUE, Esq., of Rochester.

Two great Lime-Lights are said to have been put up at the ferry landings in Liverpool, and illumine a large district with a brilliancy equal to the light of day.

MR. KRAUSE requests attention to his Patent Porous Gas-Burner Stoves, illustrated in this number.

Through the politeness of JOSIAH CHURCHILL, Esq., Secretary, we have received an interesting report of the South Staffordshire Water-Works, Walsall, England.

We have just been shown an ingenious apparatus for compressing gas into metal cylinders for lighting houses beyond the limits of gas companies. The inventor, MR. WM. H. GWYNNE, states that, with his apparatus, he can compress 2000 feet per hour by hand, at an expense of twenty-five cents. It will be invaluable to country gas companies to supply consumers too distant to be reached by their mains. MR. GWYNNE will shortly have his patent, when we will present the drawing and further particulars; meantime he can be addressed at No. 142 Center Street, in this city.

In pursuance of the plan which we had in view in removing the business of this JOURNAL to its present spacious Rooms, the AMERICAN GAS-LIGHT EXCHANGE goes into operation this day under the management of Mr. HORATIO EAGLE, of the late firm of EAGLE & HAZARD, of this city. Mr. EAGLE was Vice-President of the Kerosene Oil Company until its dissolution, and he is quite competent to manage the important interests he has taken in charge. We refer to his advertisement on the last page, and recommend Mr. EAGLE and his enterprise to the attention of manufacturers as well as consumers. All letters for Mr. EAGLE, may be addressed to our care, and all letters and papers for the Proprietor or Editor of this JOURNAL, should be addressed simply as follows:

THE AMERICAN GAS-LIGHT JOURNAL, NEW YORK CITY.

A BOARD OF HEALTH FOR NEW-YORK.

Some change in the sanitary arrrangements of the city of New-York seems now likely to be undertaken in earnest. That thousands of human lives are annually lost from causes controllable by modern science, is a fact which has been so frequently proved that everyone assents to it and admits that something must immediately be done. Last year a new sanitary measure, appointing a competent Board of Health, was pushed forward at Albany, with promising vigor, and would inevitably have become law, had not a patriotic and high-principled legislator, to whose guardianship the bill had been confided, and to whose energy it owed the success which attended its first introduction into the House, suddenly discovered, at the eleventh hour, as we are credibly informed, that two friends of his would lose office if the bill passed. We trust the promoters of the measure now before the Legislature, will be more discerning in their choice, and more careful in whom they put their trust. Every year the necessity becomes more imperative for the origination of some barrier capable of checking the spread of pestilential disease. In London, Paris, Boston, Providence, and Philadelphia, a safeguard has been found in the establishment of Boards of Health, composed of men skilled in sanitary science, and armed with the powers requisite for efficiency. Under such arrangements, mortality in those cities has diminished. In New-York, where no such Board exists, mortality is fearfully on the increase. In the tenement house, death has long held an almost uninterrupted carnival. Among the dense masses of our industrious citizens, crowded together in the most unhealthy wards of the city, there are almost as many centres of contagion as there are individuals. Were some epidemic to visit us, generated from the contaminated air and accumulated causes of disease which abound in the neighborhood of the wealthiest districts of the city, we should be visited by the natural though terrible consequences of past neglect. Thousands of persons of the very poorest class may be found

in a single block of tenement houses, within a stone's throw of the dwellings of some of our most influential citizens. The filth, the reeking putrefaction, the close confined atmosphere which invite the invasion of disease among the masses swarming in the tenement house, possess a terrible avenging power. They are capable of communicating infection. Borne on the wings of the wind, they can attack distant points, can spread misery, terror, and death throughout whole neighborhoods, or even throughout large cities. And how can it be expected that pestilence and death, as they stalk abroad, can much longer be limited and restrained. Even now the families of our wealthy classes are visited by infectious maladies which must have spread through the atmosphere from the tenement house. In view of such facts as these, is it not the grossest and most inexcusable unfaithfulness for legislators to evade the responsibility of taking action on this subject by urging objections to the details of the particular law now proposed? As the guardians of the health and lives of eight hundred thousand American citizens every representative should feel that he is under the highest human obligation to do his best for the appointment of a skillful, active Board of Health, whose power and efficiency shall be equal to the work of placing this rapidly-growing city under sanitary supervision. If the present measure has faults, let them be corrected; if it has weak points it is the duty of the legislator to discover them. Let him do so, and suggest amendments. Finally, as it would be utopian to expect perfection in any human enactment, it is evidently the wisest course for the friends and promoters of this or any beneficent measure to keep in view the great object to be accomplished, and heartily uniting on that, enter upon the work of adjusting subordinate details in a liberal, enlightened, compromising spirit.

ON THE USE OF A MIXTURE OF COALS IN GAS MANUFACTURING.

[*Continued from page* 153 *of the* AMERICAN GAS-LIGHT JOURNAL.]

In the February number of this Journal, page 153, some remarks on this subject were published, as introductory to the experimental results, which form the bases, on which subsequent conclusions have been formed, in relation to this important subject.

Instead of occupying considerable space with the mere details, I will give a single case, in which many *trials of contrast* enabled me to correct the numbers of numerous experiments, and to give these corrected numbers only. A, coal selected as a basis coal, B, did not afford marketable gas, but could be advantageously used in mixture with such coals as would afford gas, which could not be burned alone from ordinary burners.

It became convenient to express the total weight of coal mixed by the number 12.

12 lbs. of coal, B, decomposed, afforded 44 25-100 cubic feet of gas, when cooled to 60° F.

5 feet of this gas, consumed in one hour, from a standard burner, equalled the illuminating power of 12 6-10 standard sperm candles.

11 lbs. of coal, B, mixed uniformly with 1 lb. of added coal, A, = 12 lbs. decomposed under the stated conditions afforded 49 2-10 cubic feet of gas, at 60° F.

5 feet of this gas, consumed in one hour, under stated conditions, equalled 16 9-10 standard candles.

10 lbs. of coal, B, mixed with 2 lbs. of coal, A, = 12 lbs. afforded 52 8-10 cubic feet of gas at 60° F.

5 cubic feet of this gas were equal to 35 7-10 standard candles in illuminating power.

9 lbs. of coal, B, with 3 lbs. of coal, A, = 12 lbs. afforded 52 6-10 cubic feet of gas, at 60°.

5 cubic feet of this gas, equalled 42 standard candles.

8 lbs. of coal, B, with 4 lbs. of coal, A, = 12 lbs. afforded 55 4-10 cubic feet of gas.

5 cubic feet of this gas, equalled 40 standard candles.

6 lbs. of coal, B, with 5 lbs. of coal, A, = 12 lbs., afforded 52 1-10 cubic feet of gas.

5 cubic feet of this gas, equalled 40 standard candles, while burning with a smoky flame.

In the varied trials it became necessary to burn different volumes of gas for the illuminating power, and to calculate from the smaller number of feet and cubic inches, what would be the light of five feet of gas consumed; a practice not strictly correct, but which in the use of varied numbers, becomes sufficiently so, for comparisons.

The case, as presented here, does not essentially differ from many which have fallen under my observation, and is by no means an extreme one. It does happen that the coal, A has a remarkable constitution, and the only motive for using it in this illustration is the fact that its influence on other coals as well as B, has been more carefully studied.

On referring to the numbers, it will be seen that in certain proportions, the useful effect of A on B is most strongly marked, and after passing the limit of good cannel gas, in illuminating power, no additional quantity of the coal, A would improve the gas, while the economical proportion was easily found.

My experience with other coals and a great variety of mixtures, has shown a close uniformity in results with the above, and a sufficient number of observations have been made to prove the following conclusion:

In a mixture of two coals, the quality of A being supposed to be better than that of B, the influence of A on the quality of the gas produced, reaches its maximum at a certain proportion.

The smallest proportion of A, enabling the manufacturers to obtain gas of his standard, is the most economical proportion, and it holds only in the case of a single coal, B, any other coal will call for another proportion.

Most singular interesting results attend the mixing of coals in some cases, and in a few experiments, I have known the better coal A to exert on B no influence in increasing the value of the gas from B. The most valuable reactions, practically in cases, where mixed coals form the charges for the retorts, seem to take place when the coal B, in its decomposition *produces* the most water, by the union of its hydrogen constituent with an oxygen compound present also, and the coal, A, is a smoke-producing coal, or one which deposits much soot as it forms a gas.

When the manufacturer can command a coal which affords a gas of the required quality, and there is near a lower priced coal, affording gas of inferior quality, it can be determined by experiment only, whether economy would or would not be increased, by using a mixture of two coals. The experiments having this object in view, should be conducted so as to show the influence of one-tenth of A added to nine-tenths of B first, and subsequent additions of tenths of A should be made, until its weight exceeds that of B, if possible. To establish the fact, that two coals previously mixed and fully decomposed, will afford a different gas, from that obtained by mixing the products from each, separately decomposed, will require but few experiments, and this fact leads to a suggestion of possible advantage, from the use of even three kinds of coal, in some localities.

In the trials of some coals alone, it was found that the illuminating power of the gas, determined at the temperature of 60° F., suffered a rapid deterioration when cooled to 40° F., and that a coal, B, which produced such gas, when added to a small proportion of the coal, A, lost this objectionable quality; the gas obtained from the mixture, had the permanency of the best gases at low temperatures. The advantage thus gained becomes very important, in those localities where gas in it distribution is exposed to a great reduction of temperature for some time, before it is consumed.

If we consider the volume and illuminating power of gas, afforded by a given coal, as the expression of the value of that coal, or in other words assume that each coal can yield but a certain amount of light-giving gas, measured by a standard candle, we find as one of the results of decomposing such a coal, in mixture with a coal, A, that this definite limit ceases to exist. The conditions of a chemical decomposition, being changed by the presence of the elements of another body about to form new combinations in the retort, the results become modified, and much more gas may be, and often is produced from a given coal in this way, when its illuminating power is estimated in relation to its volume.

This action of a coal, A on another coal, B, is strikingly analagous to the carbonizing of wood, or water-gas, in the manufacture where rosin is used for this purpose, and there are few if any instances where the product of illuminating material in the coal, B, is not changed in amount, under this modifying action.

The coals of this country present great diversity of composition, considered in relation to the manner in which they break up into gas and other products in the heated retort, and here more than anywhere else, perhaps, there is the largest field open for choosing materials for producing the greatest volume of gas, of the best quality.

No one familiar with the details of gas manufacturing, will be disposed to underate the value of the application of chemical science in the retort house, where the process begins, and there are few gas-works so far advanced at the present time, as to be able to dispense with this aid. In the direction which the subject arising here points out, there is a pathway open, that cannot fail to lead one who carefully experiments, to advantageous and most satisfactory results.

PLATINUM.

POND-EROUS LEGISLATION.

GOVER AND MASTERSON OUTDONE. GAS AND WATER RAMPANT AT THE STATE CAPITAL.

Verily the philosophers at Albany are at a loss for occupation. Our February number recorded the brilliant efforts of Messrs. Gover and Masterson to immortalize their affectionate tendencies for injured gas-consumers, and now two other brilliant lights burst forth with a thirty-six candle splendor, throwing all others into the shades of Erebus.

First comes the philosopher from Monroe, the Honorable Mr. Pond. Hear him. In a bill of twenty-nine mortal sections, he proposes to make every man his own gas-maker, and every man's house a gas manufactory for himself or whoever else may aspire to enter into that lucrative occupation. We present the gist of his philosophy in the four following sections:

SECTION 1. Any number of persons, not less than three, may associate and form an incorporated company, for the purpose of supplying the inhabitants of any city, village or town, in this State, with water or gas, or both.

§ 14. For the purpose of carrying out the legitimate objects of any company formed under this act, the said company may purchase, take and hold any real estate, and by their directors, agents or other persons employed, may enter upon the lands of any person or persons which may be necessary for such purpose, and may take the water from any ponds, springs, rivers, streams or lake, and direct or convey the same to any place they may desire, and may lay, construct and repair any pipes, conduits, aqueducts, reservoirs, or other works and machinery necessary or proper for their purpose, upon any lands so entered upon, purchased, taken or held, and may, as aforesaid, enter upon any lanes streets, highways, roads, or public squares through which they may deem it proper to lay pipes, and may lay, construct, repair or replace the same, leaving the said streets, highways, lanes and public squares, in the same condition, as nearly as may be, as they were before such entry.

§ 15. Before taking or using any land for the porposes of this act, the directors shall cause a survey and map to be made of the lands intended to be taken or entered upon by such company, and by which the land of such owner or occupant intended to be taken or used shall be designated, and which map shall be signed by the engineer making such survey, and by the president of said company, and be filed in the office of the clerk of the county in which such company is located. The company may, by its officers, agents or servants enter upon any lands for the purpose of making an examination, and of making said survey and map, doing no unnecessary damage

§ 20 In laying pipes, conduits or aqueducts, constructing or erecting works in any of the streets, lanes, alleys or public grounds, in any city or village of this state, said companies shall conform to such reasonsible regulations as the authorities of such city or village shall prescribe.

Was ever legislation so absurd, so beneath criticism? In the very face of the propositions comes with it a commentary more forcible than could be written by another. On the principle of the fourteenth section one Pond must be already exhausted by the exhalations of the bill itself, and we think the best thing that can happen to all similar streams of legislative ingenuity is to "dry-up" instanter. The provisions of the bill are so utterly ridiculous, impracticable and futile, that the Judiciary Committee to whom it was referred, reported promptly against it, and there it ends.

From our knowledge of Mr. Pond's intelligence, social position, political tendencies and antecedents generally we confess we are at a loss to account for so *unaccountable* a proposal.

And now for Mr. Walsh, who comes into the Assembly with "An Act to protect gas consumers in the city of New York."

Mr. Walsh's bill is a short one, but nine sections, the upshot of which is that consumers shall pay thirty cents per month for the use of their meters until they have paid the cost, after which the meter becomes the property of the consumer. Two inspectors are to be appointed by the mayor and aldermen, who are to inspect and value all meters, decide disputes between the company and consumers, and do all other things that can be contrived to clog the business and disturb the harmony that should subsist between the producer and consumer, and which none could settle so well as themselves. These pets of the Aldermen shall hold office two years, and receive one thousand dollars per annum each from the city in the first instance, but to be collected from the gas companies afterwards.

THE PUBLIC HEALTH.

Editor of the AMERICAN GAS-LIGHT JOURNAL:

This question justly occupies a large share of the public attention.

The average mortality of this city is beyond what it should be. The municipal government must not relax its exertions for improvement in this respect, or serious injury may result to our business interests. Philadelphia is fully awake to the importance of existing facts, and a recent report by Dr. Jewell, is published in that city, which shows an extraordinary contrast in the mortality statistics of the two cities. These facts demand the attention of the city authorities of New-York.

The following table is compiled from official documents. In the year 1859, the mortality

In Philadelphia was	1	in	64
" Providence,	1	"	52
" Baltimore,	1	"	50
" Boston,	1	"	48
" Brooklyn,	1	"	42
" New-York,	1	"	36

By a careful analysis of all the returns, it is ascertained that if New-York had been placed on an equality with Philadelphia, in the past year, there would have been saved more than *nine thousand lives!* This is a startling fact; and yet, one of our public officers informs us, in a recent report, that New-York may be numbered "*among the most healthy cities in the world.*"

How little we have to expect in the way of improvement, under existing management of our health laws, may be learned from the following facts:

Philadelphia has a population of 625,000, New York about 820,000. The number of deaths in the former city, last week, viz., from the 11th to the 18th inst., was 204. Add to this population one-third, to make it equal to New York, and then add one-third to the mortality, and the result is 272. In New York the mortality was 507, or an excess over Philadelphia of 235.

These figures show that on every day of the seven days of last week, more than 33 lives (equal to more than one life for every hour of every day in the week,) were lost in consequence of the absence of a proper sanitary government. This excessive mortality resulted from causes within the control of medical science.

In Philadelphia, the management of its Health Department, is in the hands of medical men, fully competent to discharge its duties. In New York, to use the often quoted words of Governor Morgan, "there is no sanitary police worthy of the name."

It is to be hoped that the Legislature will take note of these facts, and give some protection to the important public interests at stake.

NEW-YORK, March 26th, 1860. P. M. W.

PATENTS.

UNITED STATES.

27,061.—Wm. S. Mead of Buffalo, N. Y., for an improvement in Apparatus for Generating Vapor in Lamps:

I claim the employment of the frustum, a, provided with a spiral thread and encased within the heater, C: the same being arranged substantially as and for the purpose specified.

27,070.—August Reichard, of Washington, Mo., for an Improvement in Pumps;

I claim a combination of the valve, B, and lever, L, valve, V, and its rod and rest, T, with the hollow plunge or piston, P, arranged and operating substantially as described.

27,104.—John F. Burgin and Augustus Koch, of Williamsport, Pa., for an Improved Hydraulic Engine:

We claim the arrangement for converting the rectilinear alternate motion into a rotating one, by means of water or any other non-elastic fluid whose force, derived from an artificial pressure, causes a wheel to turn around its axis, as described.

27,113.—John Davis and Sturgis Chaddock, of Boston, Mass., for an Improvement in Gas Retorts:

We claim, first, The movable flues, B, constructed and applied as described, in connection with the door, C, and its flue or projection, D, and the collar of the retort, substantially in manner and for the purpose as described.

Second, We claim the peculiar construction of the door, C, with its projection or flue, D, in connection with the collar of the retort and the movable flues, B; the whole being applied to the interior of the retort, and operating together substantially in manner and for the purpose as set forth.

Third, We claim the combination of the safety valve with the flue, D, of the door, C, in manner and for the purpose as specified.

27,118.—E. P. Farrar of New York City, and J. N. Farrar, of Pepperell, Mass., for an Improvement in Water Meters:

We claim, first, In combination with a mouthpiece constructed as described, the arrangement of any suitable number of radial and inclined tubes applied to said tubes in such a way that each will eject its equal share of water; this we claim in combination with the box, H, deflecting plates, r, one over each tube and secondary box, M, all arranged substantially in the manner and for the purposes set forth.

Second, We claim, in combination with the air-tight casing and tilting or measuring vessel, or its equivalent, the secondary receptacle, M, communicating with the top of case, N', and arranged in connection with the inlet pipe, G, substantially in the manner and for the purposes described.

27,124.—Sheldon Guthrie, of New Orleans, La., for an Improvement in Lamps:

I claim this new and improved arrangement of tubes or burners, and wicks for burning all kinds of common oil, grease, fluids, &c., for the purpose of producing artificial light, as substantially set forth and described, the same being applicable to tubes of any size in proportion to the degree of light desired.

27,128.—Birdsall Holly, of Lockport, N, Y., for an Improvement in Pumps:

I claim connecting the valve, H, to the piston, D, by means of the rod, g, or its equivalent, hollow piston stem, E, and regulating nut, a, arranged and operating substantially in the manner and for the purpose shown and described.

27,138.—John W. Mackenzie, of San Francisco, Cal., for an Improved Apparatus for Freeing Ship's Holds from Water:

I claim the arrangement of compartments, a a1 a2 a3 a4 a5, and valves, f, f' &c., in relation to and in communication with a ship's hold, A, and discharge passages, c, constructed as and for the purposes described.

[This invention consists in constructing the ship with a series of valved chambers at her stern, bow or sides, and in communication with a ship's hold and certain discharge passages, so that when the ship pitches fore-and-aft or rolls heavily, any water which flows into her hold, by reason of leaks being sprung, shall be automatically raised therefrom and discharged into the sea, and thus loss of life, ship and cargo prevented. We regard this as an almost invaluable invention if it will operate well in practice]

27,170.—H. K. Symmes, of Newton, Mass., for an Improvement in Mode of Extinguishing Gas-lights:

I claim the extinguishing of gas lights by means of an inverted cup, B, or its equivalent expanding chamber provided with an inlet valve, a b, so applied, substantially as herein described, in combination with the burner or supply pipe that though it will be caused to effect the shutting off of the gas, by a temporary increase or diminution of pressure, it will not permit the renewal of the supply to the burners to be effected by a subsequent diminution or increase of the pressure.

[This invention consists in certain means whereby all the street lights or out-door public lights of a city, town, village, or district may be extinguished by simply effecting such a temporary increase or reduction of the pressure on the main as will not materially interfere with the lights in dwellings and other places, by the agency of a cock or valve at the gas works, such means serving also to extinguish the lights of any series of burners by a temporary increase or diminution of pressure that will not materially affect the lights of other burners supplied by the same main or service pipe.]

27,186.—Thomas B. DeForest, of New York City (assignor to himself and Wallace & Sons, of Ansonia, Conn), for an Improvement in Lanterns:

I claim forming, out of a vertical piece of wire, two of the vertical guard wires, substantially as set forth

I also claim bending the double guard piece of wire, a, into such shape as to form the connecting link for the attachment of the handle as specified.

I also claim forming the support for the protector, C, out of one of the double guard wires, as shown and described in combination with the retaining portion of the other extended wire, as set forth.

I also claim the peculiar construction of the handle, D, as specified for the purpose set forth.

27,204.—G. B. Clark, of Leonardsville, N. Y., for an Improvement in Ventilating Apparatus:

I claim combining with the damper, f, and an air valve, j, or their equivalents, the slotted cross-bar, H, guide bracket, o, and twisted rod or wire, G, substantially in the manner and for the purposes specified.

[This invention consists in combining a damper and an air valve with a twisted rod in such a manner that the expansion or contraction of the said rod caused by the increasing or decreasing temperature of the stove-pipe causes the damper to close and the air valve to open, or vice versa. By these means the temperature of a room regulates itself in a simple and efficient manner.

27,211.—H. W. Dopp and William K. Mead, of Buffalo, N. Y., for an Improvement in Burners for Vapor Lamps:

We claim, first, The arrangement of the pipe, A, wick tube, c, and stop-cock, c', by means of which the fluid is supplied to either or both of the pipes or tubes, A and c; said cock being operated by means of a cam wheel, D, substantially as and for the purpose specified.

Second, Arranging the burner, G, with the heater, B in the manner specified; the burner being secured to the heater, and the heater being provided with pins, E, which pass through the dark portion of the flame above the burner, substantially as specified.

Third, The arrangement of the burner G, heater, B, pipe A, and tube, C, together, substantially in the manner and for the purpose specified.

27,212.—Eliakim B. Forbush, of Buffalo, N. Y., for an Improvement in Apparatus for the Ventilation of Railroad Cars:

I claim the arrangement of the revolving aprons, A, A' water and ice tank, E, and stove, K (or other heating apparatus), in a separate apartment or room within the car, relatively to the blower, H, for the purposes described

I claim the described arrangement of the distributing air pipes, S S' and T, when arranged relatively to the described apparatus for purifying the air from dust, as set forth.

27,218.—Thos. Hanson, of New York City, for an Improvement in Apparatus for supplying Water to Buildings:

I claim combining the engine which is operated by the head of water with the pump, forcing water to the upper part of the building by means of a lever with a shifting adjustable fulcrum, substantially as and for the purpose specified.

I also claim the arrangement, substantially as described, of the engine and pump so that the connecting lever can be removed and a hand lever substituted, as described, that the pump may be operated by hand when, from any cause, the pump cannot be operated by the engine.

I also claim the split packing rings and plates secured thereto, substantially as described, in combination with the conical boss on the piston rod, substantially as described, to render the piston self-packing by the pressure of the fluid.

27,239.—P. H. Roots, of Connersville, Ind., for an Improvement in Water Wheels:

I claim the recesses, f, and the pistons, C, of described configuration, so as to insure requisite strength, in combination with the cylinders, A D, so as to prevent the retardation of the piston by the water as the pistons enter and leave the recesses, substantially as and for the purposes set forth.

27,248.—Charles Von Bonhorst, of Hancock, Md., for an provement in Lamps:

I claim the combination of the air space, c', air space B, draft passage, c, and draft passage, a, in the manner and for the purpose described.

[This lamp has two wick tubes with an air space between and around them. The flames of the two wicks mingle together, and the smoke between and around the bases of the flames is supplied with oxygen, so that perfect combustion is accomplished, and the lamp sends forth a brilliant flame without smoke. This is a simple good lard lamp.]

27,268.—Joseph M. Butler, of Oxford, Miss., for an Improvement in Implement for Boring Wells:

I claim first, The employment of wire rope for operating the auger, as set forth.

Second, I also claim making the shaft of the auger hollow, as set forth.

27,272.—L. T. Conover, of Philadelphia, Pa., for an Improvement in Vapor Lamps:

I claim, first, The vertical sediment tube, and its cup, as arranged in relation to the conducting tube and reservoir and valve, as set forth.

Second, I claim the vaporizing chamber, in the horizontal conducting tube, as it is connected with the heating head, n, having its wicked extension in the conducting tube, and as it is arranged in relation to the feeding tube and burner as described.

27,293.—Henry Johnson, of Washington, D. C., for an Improvement in Vapor Lamps:

I claim, first, The use of straight pipes, B and C, for conveying the fluid to the heater or generator, A, and for conveying the vapor or gas from heater, A, to burner, D, in vapor gas-burners, operating as described and for the purposes set forth.

Second, I claim the heater or generator, A, constructed as described, for conveying the heat to the fluid in the rear of the flame, operating as set forth and described.

Third, I claim placing the screw plugs, b and a, above and in right lines with the pipes B and C, as described.

Fourth The burner, D, constructed and operating as set forth and described, for the use of vapor gas-generators.

27,308.—Silas G Randall, of Worcester, Mass., for an Improvement in Pumps:

I claim the union of the combined piston and valve chambers, G and H, with the smaller delivery chamber, B, by means of the eduction tube, F, when the piston rod, D, of the pump is conducted from the latter to the former through said eduction tube, the whole constructed and arranged substantially in the manner set forth.

27,315.—Samuel J. Shaw and H. J. Batchelder, of Malborough, Mass., for an Improved Lantern Carrier:

We claim the lantern carrier, constructed as described, and for the purpose of supporting a lantern against the breast of a person, and having both arms free to be moved in any direction.

27,324.—Augustus Watson, of London, Ohio, for an Improvement in Lining Underground Drains with Cement:

I claim, In combination with a mole for forming an underground drain, a tube for conveying cement or other plastic lining material down to the drain, in such manner that it may be spread by a troweling mole upon such parts of the drain as may be desired, substantially as described.

27,327.—Franklin W. Willard, of New York City, assignor to himself and E. G. Allen, of Boston, Mass., for an Improvement in Apparatuses for Distilling Coal Oil:

I claim the arrangement of a series of valves and ports, in combination with the revolving retort, so operating as to always leave open one or more of the said ports at the upper portion of the retort, and keep the remaining ports at the lower portion thereof closed, substantially as described and for the purpose specified.

27,332.—John B. Jones, of Williamsburg, N. Y., assignor to himself, S. W. Waldron, Jr., of Brooklyn, N. Y., and F. F. Hall, of Boston, Mass., for an Improvement in Lanterns:

I claim the combination of the perforated angle strips, E, with the corrugated, perforated corner pieces, C guards, G, loops or eyes, b, vertical rods and glasses, D, as and for the purpose herein shown and described.

[This invention consists in cutting or punching suitable slots through angular corners of the uprights or frames for holding the glass plates of the lantern at suitable points for receiving the guard wire; and in securing the wire or wires at said points around the lantern and to the said uprights by passing a suitable wire rod or rods through eyes or loops which are previous formed at those points upon the guard wire to be attached to the uprights, which loops project through the slots before mentioned.]

27,346.—J. L. Butler, Wm. L. Hosford, and D. W. Smith, of Brooklyn, N. Y., for an Improvement in Burners for Vapor Lamps:

We claim the construction of the adjustable thimble or jacket, A A, with expansion or ears, a a, and the adaptation thereto of removable heaters, B B, for the purpose set forth.

27,370.—James W. Lyon, of Brooklyn, N. Y., for an improved Machine for Finishing Plugs of Stop-Cocks:

I claim, first, Constructing the main bearing surface of a lathe spindle entirely of sharp W grooves, substantially as described.

Second, In combination with a lathe spindle and belt shipper, the friction brake substantially as described.

Third, In combination with the chuck, the pins, C6, slots, C7, and adjusting screws, C8, substantially as described.

Fourth, The arrangement in combination with the machine, of the sliding carriage, substantially as described.

Fifth, The arrangement, in combination with the machine, of the system of levers in connection with the treadle and re-acting spring, substantially as described.

Sixth, The arrangement of the parallel mandrels, G4 G5, in combination with the spindle and chuck, and carrying a cutting and tapping tool, substantially as described.

Seventh The arrangement and mode of adjusting the different parts of the cutting tool, H, substantially as described.

Eighth, The two slide rests in combination with each other and with the machine, substantially as described, and substantially for the purposes set forth.

Ninth, In combination with the spindle, brake and lever, operating the belt-shipper, the arrangement of the vibrating arm and rotating cutters, substantially as described.

Tenth, The combination of the vibrating arm with the sliding carriage.

Eleventh, The hinged hand rest in combination with the spindle and bed, A, substantially as described.

Twelfth, The combination of the hinged hand rest with the sliding carriage and treadle lever, substantially as described.

Thirteenth, The arrangement of the internal mandrel and drill, in combination with the spindle and chuck, substantially as described.

Fourteenth, The combination of the internal mandrel and drill with the back slide rest, substantially as described.

Fifteenth. And, finally, I claim, in connection with a spindle and chuck suitable for holding the cast plug, and so arranged with relation to the motive power as to be rotated in reverse directions or be held firmly in a fixed position, the cutting tool, H and tap, the the cutting tools, I I', and the vibrating rotating cutter or cutters, or their equivalents, when arranged substantially as described, so as to successively perform their respective parts of the operation of finishing the plug without removing it from the chuck, and repeat their operations upon each successive plug, substantially as described.

27,373.—Hazel Mayhew, Jr., and E. Mayhew, of Lancaster, Pa., for an Improvement in Preparing Coal:

We claim the improvement in making coal better in quality by bringing it into contact with hydrogen, by the mode and manner specified.

27,400.—Henry Waterman, of Haverhill, Mass., for an Improved Apparatus for Hoisting Water:

I claim the trough, D, around the well curb, in combination with the self-discharging bucket, H, when operated substantially as set forth.

27,401.—E. D. Williams, of Philadelphia, Pa., for an Improvement in Solidified Fuel from Coal Dust:

I claim compounding and preparing a solidified fuel from coal dust, peat, and other like substances, by mixing the same with glutinous paste, subjecting the composition to pressure in molds, and subsequently drying the condensed blocks, as set forth.

27,426.—Adolph Brown and Felix Brown, of New-York city, for an Improvement in Steam Pumps:

We claim, first, Connecting together the steam and pump cylinders of steam pumping engines by means of frames or stretchers, which contain the bearings of the crank shaft—constructed and arranged as described, and for the purpose set forth.

Second, The hinged valves constructed as above described, when the same are arranged and used in combination with steam pumping engines, as set forth.

27,448.—W. W. Horton (Assignor to himself and Lucius O. Vebber,) of Schuyler's Lake, N. Y., for an Improvement in Water Wheels:

I claim the specific construction of the bucket hereinbefore described, embodying a straight line in combination with an involute of a circle; the straight line and involute being relatively arranged to each other and the face of the wheel as set forth.

27,451.—John P. Kennedy, of Trenton, N. J., for an Improvement in Attaching Mouth-Pieces to Clay Gas-Retorts:

I claim the securing of the mouth-piece to an earthen retort by means of an iron yoke or band firmly clasping the neck of the earthen retort behind the collar, and having bolts on the outside of the retort passing to the flanch or mouth-piece—thus securing the earthen collar between the mouth-piece and the yoke or band; the whole being substantially as described.

27,460.—S. T. McDougall, of New-York City, for an Improvement in the Manufacture of Gas:

I claim the combination of an air blast, a vaporizing chamber, a retort and furnace, a purifying vessel and a gasometer, arranged and constructed substantially as described.

27,470.—F. S. Pease, of Buffalo, N. Y., for an Improvement in Hydro-carbon Vapor Apparatuses:

I claim the combination of the box, A, when provided with a supply pipe, C, at the top, and with pans, B, and plates, b, as shown, with the condenser, E, constructed as set forth; the whole operating in the manner and for the purpose represented and described.

[The object of this invention is to facilitate the operation of impregnating inferior gas with the vapor of hydro-carbon liquids, such as naptha, bensoles, ether, &c. The gas passes over a series of shallow pans filled with the liquid; and, in order to cause the gas to absorb the vapor more readily, it is compelled to pass through a series of stops of wire gauze or perforated sheet metal, whereby a number of minute streams of gas are brought in contact with a similar number of streams of vapor, causing both to intermingle quite readily.]

27,485.—Augustus Tufts, of Malden, Mass., for an Improvement in Lanterns :

I claim in a lantern the combination of a series of horizontal refracting zones or belts formed on the exterior of the lantern, with a series or vertical ribs formed on the interior thereof, substantially as described, whereby the lights are both multiplied and elongated, as set forth.

27,499.—William L. R. Mattason (assignor to himself, and J. M. French & Co.,) of Rochester, N. Y., for an Improved Feathering Paddle Wheel :

I claim the bearing resting arm or shoulder, substantially as and for the purpose of adjusting the center of the eccentric wheel, as described.

27,500.—Zuriel Swope (assignor to himself, H. D. Musselman and Wm. D. Sprecher,) of Lancaster, Pa., for an Improvement in Lamps :

I claim arranging the funnel, E, and pipes, F G and H, with such relation to the wick tube I, that heat may be taken from the flame and passed down into the lamp under the wick tube, so that the heated oil will rise towards the flame and around the wick, substantially as and for the purpose specified.

THE MOTION OF GASES.

[*Continued from page* 184 *of the* AMERICAN GAS-LIGHT JOURNAL.]

21. Again let us resume [8], or

$$V = \frac{1 + e\,(t-32)}{1 + e\,(t_1-32)}\,V_1;$$

in which V is what V_1 becomes during a change of temperature from t_1 to t, the external pressure remaining constant; and let it now be supposed that the initial pressure, instead of remaining constant, also undergoes a change. Then it is evident that the value of V in [8] must be different, for example, become V^1. But if p_1 represent the initial pressure and p^1 the new one, we shall require by [12]

$$\frac{V^1}{V} = \frac{p_1}{p^1};\ \text{or}\ V^1 = V\,\frac{p_1}{p^1};$$

whence by substitution from [8],

$$V^1 = \frac{p_1}{p^1}\cdot\frac{1 + e\,(t-32)}{1 + e\,(t_1-32)}\,V_1;$$

or by omitting accents,

$$[19]\ V = \frac{p_1}{p}\cdot\frac{1 + e\,(t-32)}{1 + e\,(t_1-32)}\,V_1;$$

a formula, by which, knowing the volume V_1 at a temperature t_1 under a pressure p_1, we may determine the new volume V at a temperature t under a pressure p.

Hence, also, replacing in [19] the ratio of the volumes by the inverse ratio of the densities, and solving in respect to d, we have

$$[20]\ d = \frac{d_1}{p_1}\cdot\frac{1 + e\,(t_1-32)}{1 + e\,(t-32)}\,p;$$

from which, with the requisite data, we may compute the density of any gas.

Finally, if we solve [19] and [20], in respect to p, we shall find

$$[21]\ p = \frac{V_1\,p_1}{V}\cdot\frac{1 + e\,(t-32)}{1 + e\,(t_1-32)} = d\,\frac{p_1}{d_1}\cdot\frac{1 + e\,(t-32)}{1 + e\,(t_1-32)};$$

formulas from which we may obtain the tension in terms of the volume and temperature, or of the density and temperature.

We proceed in the next place to consider the tension under sudden changes of volume or density.

THE TENSION OF A GAS RESULTING FROM SUDDEN CHANGES OF DENSITY UNDER A CONSTANT EXTERNAL TEMPERATURE.

22. It has already been intimated, (Sec. 17,) that the Law of Mariotte fails in cases of *sudden changes* of density, and in such a manner, that the latter, instead of varying simply as the tension, varies less than the tension; so that we require an expression of the form

$$[22]\ \frac{d}{d_1} = \left(\frac{p}{p_1}\right)^{\frac{1}{r}},$$

to express this relation, instead of the more simple one, [14]

$$\frac{d}{d_1} = \frac{p}{p_1}.$$

Raising both members of the former to the power denoted by r, and we find

$$[23]\ p = p_1\left(\frac{d}{d_1}\right)^r;$$

in which the tension varies in a *higher* ratio, than the density simply, since by hypothesis r is greater than unity.

Now this change of tension, beyond what would be due to a change solely of external pressure, arises, as we have already noticed, from changes of temperature within the gas. And since it can make no difference in respect to the *effect* of these changes of temperature, whether they result from the action of internal or external heat, it is evident that the tension, in the case of a sudden change of density, will be as truly expressed by the second member of [21] as in the case of a gradual change of density, for which that expression was deduced. Accordingly, we may equate the second members of [21] and [23], or make

$$p_1\left(\frac{d}{d_1}\right)^r = p_1\,\frac{d}{d_1}\cdot\frac{1 + e\,(t-32)}{1 + e\,(t_1-32)};$$

where we observe that the new temperature t is no longer a datum, as in the former case, but is now an element to be sought.

Dividing out the common factor

$$p_1\,\frac{d}{d_1}$$

from both members of the last equation, and

$$\left(\frac{d}{d_1}\right)^{r-1} = \frac{1 + e\,(t-32)}{1 + e\,(t_1-32)};$$

where we observe that the division of the first member by d over d_1 lessens the exponent by unity. Again, by multiplication, we have

$$[1 + e\,(t_1-32)]\left(\frac{d}{d_1}\right)^{r-1} = 1 + e\,(t-32);$$

and solving in respect to t we finally obtain

$$[24]\ t = \left(\frac{1}{e} - 32 + t_1\right)\left(\frac{d}{d_1}\right)^{r-1} - \frac{1}{e} + 32.$$

23. Hitherto, nothing has been said in respect to the value of r in the preceding equations, beyond the statement that it is greater than unity. That r must be greater than unity, will be apparent by considering for a moment [23]. If, in this formula, we make $r = 1$ the value of p reverts to what, in accordance with the Law of Mariotte, would be the value of the tension in consequence of a mere change of external pressure. But by hypothesis [23] gives the value of p when, in addition to a change of external pressure, there is also a change of internal temperature,—from the liberation or diffusion of heat belonging to the gas,—which, as we have already seen, (Secs. 14. 18,) *concurs* with the external pressure, acting in the same sense as the latter and exalting its effect on the tension, both during compression and rarefaction. Hence, we conclude that the exponent r must be greater than 1. It may also be shown that it cannot exceed 2.

24. A series of experiments properly made would conduct by an easy discussion to the determination of r. There have been, at different times, a considerable number of experiments made on the tension and temperature of gases, under sudden variations of density, though not in general leading to very accordant results. The sources of error in experiments of this nature are such as to suggest the propriety of conducting them on a much larger scale—that is to say, of operating upon much larger quantities of the gas—than has ordinarily been practised.

Of the few experiments which have been made on a scale of quantities in practical use, an interesting series was made and reported by Prof. Smyth, (Edinburgh New Phil. Journal,) a few years ago, who operated with the powerful blast engine of a smelting furnace, in Scotland. With the barometer at 29.6 inches of mercury, Prof. Smyth concluded that, during a compression under 7 inches of mercury, the temperature of the air rises from 63° to 92° Fah., while the subsequent rarefaction causes the temperature to fall from 92° to 65°. Here, then, we have the following data for the determination of r:

First, for compression,

$$p_1 = 29{\cdot}6\ ;\ t_1 = 63^\circ\ ;$$
$$p\ = 36{\cdot}6\ ;\ t\ = 92^\circ\ ;$$

Secondly, for rarefaction,

$$p_1 = 36{\cdot}6\ ;\ t_1 = 92^\circ\ ;$$
$$p = 29{\cdot}6\ ;\ t = 65^\circ.$$

If now, we take the common logarithms of [23] and [24], we shall have, after introducing the second value of e from [5],

$$r\ (\log.\ d - \log.\ d_1) = \log.\ p - \log.\ p_1\ ;$$
$$(r-1)\ (\log.\ d - \log.\ d_1) = \log.\ (t+458) - \log.\ (t_1+458);$$

hence by elimination of the factor $(\log.\ d - \log.\ d_1)$ we have

$$[25]\ \frac{r}{r-1} = \frac{\log.\ p - \log.\ p_1}{\log.\ (t+458) - \log.\ (t_1+458)};$$

from which, with data similar to the preceding, we may readily deduce the value of r.

Thus, from the experiments of Prof. Smyth, we shall find, by substituting in [25] the values of the data just given,

$$\frac{r}{r-1} = 3{\cdot}918,\ \text{or}\ r = 1{\cdot}343,$$

$$\frac{r}{r-1} = 4{\cdot}217,\ \text{or}\ r = 1{\cdot}311,$$

for the respective cases of compression and rarefaction. These values of r, by substitution in [22] [23] [24], appear to satisfy the several experiments of the series, thus showing that r is sensibly constant. Of course, much more extended series of experiments will be necessary before a satisfactory judgment can be pronounced in respect either to the actual numerical value of r or its presumed constancy of value.

25. On a basis purely theoretical, the value of r has also been shown to be represented for any gas by *the ratio of its specific heat under a constant pressure to its specific heat under a constant density*; or

$$[26]\ r = \frac{Sp.\ heat\ under\ const.\ pressure.}{Sp.\ heat\ under\ const.\ density.}$$

It would be unsuited to the practical objects of this discussion, however interesting in a scientific aspect, to enter into detail on the point here presented. It should, however, be remarked that the determination of this ratio of specific heats, as based upon an independent estimate of the specific heat of a gas under constant density, has been attended with considerable uncertainty by reason of the experimental difficulties of the last named determination. More recently, Messrs. Joule and Rankine have determined this ratio, in a manner entirely different from that of any preceding observer, and, as they believe, with a satisfactory degree of precision. Their estimate of this ratio for atmospheric air, is the following :

$$[27]\ r = 1{\cdot}4.$$

The previous determinations of French physicists had given values to r varying from 1·348 to 1·421. For other gases, the value of r is somewhat different. Thus, for oxygen and hydrogen, Rankine makes the value of $r = 1.426$.

Adopting from Joule and Rankine's determinations this value for r in the case of atmospheric air; also introducing the value of $e\,(=1$ over $490)$ from [5]; we shall have from [22] [23] and [24]

$$[27]\ \frac{d}{d_1} = \left(\frac{p}{p_1}\right)^{\frac{1}{1{\cdot}4}};$$

$$[28]\ p = p_1\left(\frac{d}{d_1}\right)^{1{\cdot}4};$$

$$[29]\ t + (458 + t_1)\left(\frac{d}{d_1}\right)^{0{\cdot}4} - 458.$$

as practical formulas applicable to this class of inquiries, and which are readily used with the aid of common logarithms. These formulas give results slightly in excess of those obtained by the experiments of Prof. Smyth and others; but in the absence of more extended experimental data, it may be more rational to adopt these; keeping in mind that, in our experiments on sudden changes of density, the constant tendency to exchanges of heat by conduction or radiation, *might sufficiently account* for the differences here noted.

Erratum.

In the *title* immediately preceding Sec. 20 of the March number of this JOURNAL, for VARIABLE EXTERNAL PRESSURE, read VARIABLE EXTERNAL TEMPERATURE.

(To be continued.)

LOSS OF LIGHT BY GLASS SHADES.

Mr. Willaim King, of Liverpool, states in a recent letter to an English publication, that

The following table exhibits the amount of light lost by the use of the various shades therein enumerated :

Description of Shade.	Loss of Light.
Clear glass	10·57 pr. ct.
Ground glass, (entire surface ground)	29·48 "
Smooth opal	52·83 "
Ground opal	55·85 "
Ground opal, ornamented with painted figures, the figures intervening between the burner and the photometer screen.	73·98 "

As the large amount of light is lost by the use of a clear glass shade excited some surprise, a sheet of common window glass was placed between the burner and the photometer screen, when it was found that 9·34 per cent. of the light was intercepted, thus confirming the result obtained by the employment of a shade of clear glass.

PROPOSED AERIAL VOYAGES TO LONDON.—At a meeting of the Boston Board of Aldermen, on Monday afternoon, propositions were received from the aeronauts, Wise of Lancaster, Penn., and La Mountain, of Troy, offering to make aerial voyages to Europe if the city would defray the necessary expense. Mr. Wise wished to start from Boston Common on the 4th of July next, and thought the expense would be $6.000, while Mr. La Mountain estimated the probable outlay at $4,000, and desired to leave in May or June.

EXPLOSION OF A FIRE ANNIHILATOR.—One of four Phillip's Fire Annihilators, stored in a small room on the second floor of the building Nos. 27 and 28 Frankfort Street, occupied by E. O. Jenkins as a printing office, exploded on Tuesday afternoon, March 13, causing an alarm of fire, and producing great consternation among the employes—many of whom were females. The firemen soon put out the fire, which had caught in a pile of paper, and the damage, which probably will not exceed $300, was mostly done by water. Mr. Jenkins says that, just before the explosion occurred, he was talking with Mr. Leavitt, of the firm of Leavitt & Allen, and that he observed a vapor, accompanied by a hissing sound, escaping from the room in question, and believing that the steam boiler was about to explode, he ran into the street; his foreman, however, ascertained the origin of the fire, and threw the annihilators out of the window. The explosion is supposed to have resulted from the disorganization of the chemical gases of which the contents of the annihilator was composed. A quantity of valuable books, belonging to the American Tract Society, and stored in the adjoining building No. 31, were injured by water to the extent of $250.

EXPLOSION IN A COAL OIL WORKS.—An explosion recently took place at the Aladdin Oil Works, in Armstrong county, Pa., caused by one of the foremen placing an open light, which he carried in his hand, in the vapor arising from the oil in one of the tanks. No explosion can take place with any oil until once it is evaporated and becomes gas, then mixes with the atmosphere. The vapor of any oil, when it becomes saturated with oxygen, is more explosive than gunpowder.

SANDERS' WATER-GAS.

THE KEYSTONE GAS CO.,
OF PENNSYLVANIA,

ARE THE OWNERS OF SANDERS' PATENT FOR

Manufacturing Illuminating Water-Gas,

Are now prepared to SELL RIGHTS for the Manufacturing of this CHEAP ILLUMINATING GAS in any CITY, TOWN, or VILLAGE in the States of PENNSYLVANIA AND MARYLAND, on REASONABLE TERMS

Communications addressed to S. M. DAY, Secretary, at the Branch office, 417 Walnut-street, Philadelphia, will receive immediate attention.

☞ RIGHTS for the NEW ENGLAND, SOUTHERN, and WESTERN STATES also for sale, by applying as above.

CITIZENS' GAS-LIGHT COMPANY OF BROOKLYN, NEW YORK.

This is known as the opposition Company of Brooklyn. The names of officers have been heretofore given in this JOURNAL. The capital is fixed at one million dollars, of which $632,480 are reported as subscribed—the larger portion by capitalists, although a very considerable share by about 500 gas consumers, in sums varying from $100 to $200.

The Company have managed to get a very liberal grant from the city, embracing the entire consolidation of Brooklyn, Williamsburg, Greenpoint and Bushwick; and it is worthy of remark that, in the face of this threatened opposition the stocks of the old Brooklyn and Williamsburg Gas-Light Companies have steadily advanced in market value; indeed, orders for them are now existing at fully ten per cent. higher than when the Citizens. was organized, last Fall.

The Company have purchased 72 42-100 lots, each containing 2,500 square feet, and embracing a water front of 750 feet on the Gowanus Canal, costing the sum of $38,210.

The contracts for the entire works were given out last week: First, to a Mr. Robert Walker, whose sureties finding they would loose $30,000 by the operation, refused to justify; and then to B. G. Fairchild, of Ogdensburg, N. Y., of Croton Aqueduct memory. Mr. Fairchild is said to be entirely responsible.

The works are to be built under the superintendence of Tyler Sabbaton, engineer of the Company, who has drawn the plans for the immediate supply of 10,000 consumers, including street mains to the extent of seventy-four miles, but so arranged as to be able to enlarge them on their present land, to meet any increased demand.

The Company intend to supply gas in October next. They promise their stockholders a return of ten per cent. on their investments, and their consumers good gas at a reduced price, viz., $2 per 1000 c. f., with the view of utilizing it for cooking and heating purposes, in addition to that of light.

The Company's office adjoins the post-office in Montague street, Brooklyn.

NATURAL OIL IN PENNSYLVANIA.

The oil springs at Franklin, Venango Co., continue to produce considerable public excitement. Our readers will remember, that, as we have stated in former papers, the oil exudes from the earth in various localities in Venango Co., and is found in limited quantities; and also, in Crawford and other counties. Under the names of Naptha Rock Oil or Petroleum, Seneca Oil, &c., it has long been known in the arts; but until last fall, it was not raised in sufficient quantities to enlist much attention. It appears that several years ago Messrs. Eveleth and Bissell, of New York, purchased a large tract of oil land on Oil Creek; these lands were leased afterwards by a Mr. Drake and others, who proceeded to bore a well on those lands, and succeeded, at the depth of about seventy feet, in striking a vein of oil which has yielded since an average of about one thousand gallons a day. The lessees pay the proprietors about 12 cents a gallon on all oil raised. The excitement soon spread, and other parties entered into the business, some of whom have been eminently successful. The McClintock Well is now yielding about ten barrels a day. The Bousdell Well is said to be even better than that. A Mr. Evans, of Franklin, has also a very productive well.

There are probably at least 100 wells now sinking in this neighborhood. The principal operators here are Brewer, Watson & Co., of Titusville, Kier Brothers, of Pittsburg, and Day, Eveleth & Bissell, of New York. These latter gentlemen are also erecting a large refinery.

The deepest well yet sunk here is only about 280 feet. The oil is pumped up mingled usually with salt water of about five degrees of strength. It seems to be most abundant in a soft bluish shale or slate rock, and lies far below the lowest bed of coal.

The excitement is intense, and persons are flocking from all directions. The oil is claimed to be an excellent illuminator. Some assert that it can be used for lubricating purposes, although the latter has not been fully tested.

A GAS COMPANY IN A TIGHT PLACE.—We are informed that one of the Albany Philosophers asserts, that so far from having any personal spite against the Gas-Light Company in his district, he has their true interests *bound up in his heart.* A tight spot that for the Company!

OPEN-ENDED RETORTS.

DALKEITH GAS-WORKS, SCOTLAND,
Feb. 14, 1860.

To the Editor of the AMERICAN GAS-LIGHT JOURNAL:

I feel much gratified that the open-ended retort invented by me a few years ago, and applied for convenience in the establishment under my charge, should be found to possess advantages which have recommended its adoption in so many gas-works since it became known. Not less flattered do I feel from the manner in which the subject has been taken up by the English Journal of Gas-Lighting, and received by my British brethren.

From the inquiries you make, and the suggestion from gas engineers "that the escape-pipe would be more efficient at the back end of the retort," I much fear that the construction and action of the retort is not clearly understood. To make further explanations more intelligible, I beg to annex a pen and ink sketch of the retorts as fitted up in the works here, and in several other gas works for whom I was engineer.

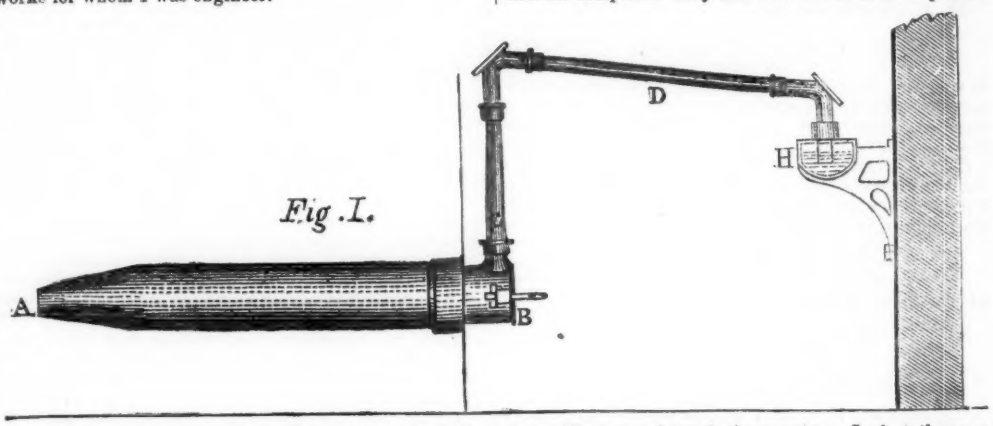

Fig. I.

Referring to the above sketch, the retort A B is the same as that previously shown; the pipes, C D, are for leading off the gas from the retort into the hydraulic main, H. You will therefore observe that the pipe, C D, has nothing to do with the process of *decarbonizing*. All that is necessary to this end is simply the cut door on the front, at B, and the open end, at A. To illustrate the mode in which I always work it, and also in other places where it has been adopted. I refer you to the section Fig. 2. Suppose that the carbon had accumulated to ex-

Fig. 2.

cess about the rear half of the retort, the air would require to enter by the back, at A, and escape by the front. To secure this action, take off the small cover, at A, place the cut on, at B, in the position shown, and immediately the air starts into motion in the direction of the arrows. The oxygen of the air attracts the incandescent carbon, each two atoms of oxygen taking up one atom of carbon; or, in other words, each six rounds of carbon requiring sixteen pounds of oxygen for the removal. To change the current of air in the opposite direction, the cut door on the end B is turned upside down, when it takes the direction as shown of Fig. 3 There are many plans which could be adopted to increase the current, but my experience shows that such is unnecessary, as this is quite efficient. When the temperature is high, and the surface of carbon extensive, the union of carbon and oxygen is

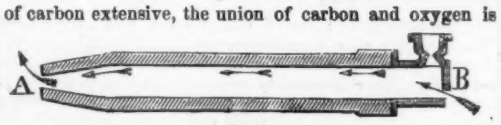

Fig. 3.

atom to atom, showing how readily the carbon enters into combination.

I thank you most cordially for your suggestion as to sending a model of my retort. Though at present I do not see any personal advantage that can arise from doing so yet, as it may be useful to others in the profession, I have set to prepare a model of an oven of three retorts, so constructed that it can be taken down, so that the arrangement and parts can be separately examined. This shall be my first contribution towards furnishing your Rooms as an educational museum.

From the liberality you show in opening your columns for the discussion of every point connected with gas directly or collaterally, I expect your paper will become even more influential, and it has done much in the short period of its existence. I may trouble you occasionally with a note upon some subject or other, worthy the notice of gas engineers, as such may come under my own observation. I am, sir,

Your obedient servant,
JOHN YOUNG.

PROPOSED CONGRESS OF GAS COMPANIES.

PHILADELPHIA, March 13th, 1860.

To the Editor of the AMERICAN GAS-LIGHT JOURNAL:

I wish to suggest through your Journal a matter that might be of the utmost importance to Gas Companies. All kinds of business, and of much less importance, has its Board or Board of Trade to regulate and meet together and exchange views upon matters connected therewith, at least once in every year. The matter which I would like to see brought about is this: That a Congress of Gas Companies be held at least once in every year, in New York City, and every chartered Gas Company (leaving out those in opposition) to have one representative regularly chosen The object of this annual Congress to consult upon all matters relating to the manufacture of gas, as well as construction, kinds of coals to be used, that all companies may manufacture as near as possible one uniform gas through the country. In fact, there are many important matters connected with gas-lighting that might be greatly benefited by such an exchange of opinion and views. If gas companies generally will respond, and give their views upon this subject, they might make your JOURNAL the medium for the meeting, and let it be called for October next. The various companies may write you and request the call to be made; or, if they will address me I will be pleased to do what I can to bring about this important matter, at an early day.

My object is to do all I can for the general benefit of Gas Companies, and this seems to me the only way the object can be attained.

I am yours, truly,
S. R. BRICK,
Gas-Engineer, &c.

REMOVAL OF CARBON FROM RETORTS.

SIR,—Much inconvenience at times arises in gas-works from the accumulation of carbon in clay retorts, and the stopping up of the stand-pipes. I myself suffered from this cause last winter, and was induced to devise a plan, which I believe has not yet been adopted in England, for cleaning out the retorts and pipes; and, as it has been completely successful, a description of the method will, I think, be of some interest to your readers.

My retorts are of clay, 17 feet 6 inches long, and have a mouth-piece at each end. As soon as the deposit begins to be troublesome, I put into one of the mouthpieces of the retort a wrought-iron pan (shaped to the form of the retort), 18 inches long and 6 inches deep, filled with water. Both retort-lids are then put loosely on, and the cover of the stand-pipe at the end of the retort opposite to that in which the pan is placed is taken off. The open stand pipe acts as a chimney, and draws the steam which is generated along the retort. The steam is decomposed by contact with the graphite, and in about twenty-four hours the latter can be loosened and removed with facility. The tar, &c., in the stand-pipe will also be completely burned out. GEORGE HOWITZ.

Gas-Works, Copenhagen, Dec. 14, 1859.

ON THE PREVENTION OF NAPTHALINE.

Messrs Editors:

Your correspondent, Mr. Joseph Battin, inquires, in the January number of the AMERICAN GAS LIGHT JOURNAL, what is the cause of deposits of napthaline in gas pipes, so as to form obstructions, and how they might be prevented. It was not until about two years ago that I became acquainted with the article, and then I was introduced to it by finding it deposited in the elbows of the service-pipe leading to the public lamps, and to such an extent as to obstruct entirely the flow of gas through them. The article was new to me; I did not know even its name. I sought for information concerning it through all the works on gas-making I could find, and not one that I ever saw even refers to it as a cause of obstruction in the pipes. I then referred to chemical works, where, under the head of coal distillation, in the list of articles produced, I found napthaline, which was described as crystalizing in white silvery scales—specific gravity 1.048; melts at 136°; burning with a strong, smoky flame; smell powerful and very peculiar; insoluble in water, but abundantly soluble in oil, ether and alcohol,

and that from the last two it crystalizes in thin silvery plates. It was evident enough that the article just found corresponded in some particulars, and I immediately set about testing the other points, to make the agreement complete if possible. The silvery plates were present, and the strong peculiar odor, and the thick smoky flame, were at once produced by igniting it. Upon trial, it was found insoluble in water, and that alcohol and ether dissolved it freely; and upon slow evaporations, beautiful thin plates of a silvery appearance were produced. Its melting point was next obtained, which, although differing from that above mentioned, corresponded so nearly that I considered them identical, more particularly as the melting point was found to differ in different samples of the article. Its specific gravity, too, was found to correspond nearly with that given for napthaline. Therefore I concluded, from these particulars, that the article *was* napthaline; and subsequent observations and inquiries have convinced me of the correctness of my conclusion. I have also learned by observation, experiment and inquiry, that it is eminently the product of a high temperature, and that it is soluble in carburetted-hydrogen gas, and that it crystalizes freely from this upon any material reduction of temperature. Laurent, the only chemist who has given much attention to the production and chemical properties of this article, states that it is produced by distilling coal at a high temperature. In this opinion he is supported by Graham, and also by Turner, I believe. My experience inclines me to the same belief; for, since a high heat has been used in our works, this article has made its appearance, and not before. Being deposited from the gas upon a reduction of temperature, the only proper way of preventing its deposition in any place where it can produce an obstruction to the flow of gas, is to cool the gas so low before it enters the mains as to condense all excess of this rich hydro-carbon in places where no obstruction can occur. It may be removed from any main that has a proper drip, by passing a current of water through it at a moderate pressure; for being so nearly of the same specific gravity, it will be readily suspended in the water, and carried off with a gentle current.

Feb. 18th, 1860. JERSEY.

EVAPORATION OF WATER IN GAS-METERS.

SIR,—Having had my attention directed to the loss of water by evaporation from wet gas-meters, I sometime ago determined to ascertain the actual loss, in a given time, by an experiment on a tolerably large scale.

With that view, I took particular care during our survey in the month of May last to adjust correctly with water all the meters which were at that time in action. They received no more attention during the ensuing six months; and when the 15th of November came round, I provided myself with a flask holding exactly one gallon, a filter, and a small tray for receiving the surplus water. Equipped with these I proceeded on my survey, noting each day the quantity of water used, as well as the number of meters gone over, and at the end of the survey I ascertained that the number of wet meters amounted to 528, and that the quantity of water required was 24 gallons. The numbers and sizes of meters were as follows:

474 No. 1 meters.
36 No. 2 "
14 No. 3 "
4 No. 4 "

Total, 528

Their united area (measured at the water-line) amounts to 41,421 square inches, giving an average area to each meter of 78·5 inches nearly.

We also found that one gallon of water sufficed for 22 meters; and 277,274 cubic inches, or one gallon, divided by 22 gives 12·6 cubic inches as the actual quantity of water lost by each meter during the six summer months above noted.

The quantity of gas registered on these meters during the time of the above experiment amounted to 1,100,000 cubic feet; and it is very remarkable that during the whole summer my attention was not called to them in any way, although they are (almost without exception) fitted with valve and float.

I may also state that the initial pressure at our works is 2 inches in winter, but from the works standing on an elevation rather higher than the town itself, and the town being of the form of the letter A, with the works situated at the apex, the pressure averages only 1¼ inches to our consumers.

Dec. 20, 1859. J. R. H.

FROM THE ST. JOHN, N. B., WATER WORKS.

SAINT JOHN, N, B., *March* 6, 1860.

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We hope that the success of the AMERICAN GAS-LIGHT JOURNAL will be commensurate with the ability and enterprise that have brought it into being. It fills an important gap in Engineering literature, and must become a favorite not only with the profession but also with all who are interested in the progress of social science. Its field of operations is extended, and second to none in importance, and judging from the samples we have seen, as well as from the long array exhibited of names, distinguished in literature and science as regular contributors to its pages, there is no doubt that its influence will be widely felt, not only in diffusing sound information upon the particular subjects to which it is more especially devoted, but also upon all other cognate topics of enquiry.

COAL IN THE UNITED STATES.

Imported Coal.—The only countries from which coal ever finds its way into the United States, are Great Britain and British America, and the contributions from thence appear to be annually diminishing. For a time there was an increasing foreign importation; viz. from 22,123 tons in 1821, to 181.551 tons in 1839. By the operation of the American tariff, this advance was not only checked, but a retrograde movement was produced, so as in 1843 to amount to only 41,163 tons, by the United States returns. By the last annual return, that for 1847, the entry of foreign coals, whether from Europe or from British America, was 148 021 tons; of which from 12,000 to 15.000 tons were re-exported, for the service of the English steamships. 1850, 180,439 tons were imported into the United States; 1853, 231,508.

Bituminous Coal.—We have already indicated that we possess no authentic data for determining the progressive production of this description of fuel in the United States. Such informal details as have reached us, will appear in the proper place; and we can only remark here that the rate of increase is evidently very rapid.

Anthracite.—Of this important combustible we shall have much to say, and we possess abundant testimony upon which to found our calculations. The production of anthracite may be said to be entirely confined to the State of Pennsylvania, which possesses a numerous and interesting group of coal basins of various sizes and characters.

Our returns show that the consumption of anthracite,—in other words, the coal trade,—commenced with 365 tons in the year 1820: that the production reached 48,047 tons in 1827; that it had increased to 881,026 tons in 1837, and advanced to three millions of tons in 1847; without including much that is consumed on the spot, in the mining districts, or in the interior of the country.

The increased production, therefore, was, in the first ten years, viz., from 1827 to 1837 1,735 per cent.; in the second ten years, viz., from 1837 to 1847, 240 per cent.; and in the twenty years previous to 1848, that is, from 1827 to 1847, 6,150 per cent.

We introduce another view of this subject, which exhibits this accelerated increase in the consumption of anthracite, perhaps, with yet greater perspicuity. The amount which was periodically forwarded to market, exclusive of the consumption in and near the places of production and which has not been estimated, is as follows:

* Aggregate in the 21 years from 1820 to 1840, inclusive,	6,847,172 tons.
In the succeeding 7 years to 1847, inclusive,	12.371,961 "
Total furnished from the commencement,	19,219,133 tons.
From 1848 to 1853, inclusive,	23 841,358 tons.
Total furnished from the commencement,	43,060,491 "

TEMPERATURE OF CROTON WATER.—Notwithstanding the multifarious duties which crowd upon the Commissioners of the Croton Acqueduct department, they are not insensible to the demands of science, and pay due regard to its claims. Many months ago, tables were prepared under the direction of Mr. Craven, the Chief Engineer, for the purpose of recording the temperature of the air and water at five different points on the line of the Acqueduct, viz., at the dam at Tarrytown, at a point about five miles above High Bridge; and at Eighty-sixth and Forty-second streets. The temperature of the air and water is taken three times daily, the tables being forwarded and duly recorded, for permanent use, by Mr. Winder, chief clerk in the office of Mr. Craven. From the February record, as kept at Tarrytown, and which is within half a degree the counterpart of the other stations, we gather that the temperature of the water in the acqueduct ranged from 33° to 35°, while the temperature of the air ranged from 59° to 9° below zero—the one varying only two degrees, the other sixty-eight: a fact for which philosophers must account. The water in the acqueduct has only varied one inch during the month, viz., from 4 feet 6 inches to 4 feet 7 inches.

SANITARY STATE OF NEW YORK CITY.

Probably no other maritime city, and but very few populous inland cities, can compare with New-York in respect to conditions favorable to continued natural salubrity. Boston, for example, does not enjoy our mild and equable climate, and our great preponderance of sunny days. London is often shrouded in a dense fog of smoke and vapor, and is nearly destitute of the *natural* conditions of salubrity. Good water is scarce there, and in meagre supply. Effectual drainage and sewerage, previous to the expensive and magnificent undertaking now in progress are nearly impossible, and the Thames itself is a vast uncovered sewer. Again, the city of Paris, which, like London, boasts of an average mortality, more than twenty-five per cent. lower than that of New-York, is not only an inland, but an almost "land-locked" city, situated in a geographical basin, with a single stream of moderate size, and the natural ventilation of the entire area of the basin necessarily very imperfect. In consequence of these natural disadvantages, that city is afflicted with a persistent and very fatal form of endemic typhoid disease. But still the rate of mortality in Paris and in London is far below that in New-York; in each of those cities the rate at present being about one death in every forty persons, per annum; while Berlin, and some other great continental cities have a still lower rate of mortality. We would here remark that in all large cities which exhibit such an improved condition of the public health, that improvement has been in all cases coincident with and directly induced by those municipal or State sanitary reforms which a previous high rate of mortality and alarming civic insalubrity, had suggested. The mortality in the city of London, as exhibited in the very accurate mortality registry of that city, in various decades in which no pestilential epidemics prevailed during the last and the previous century, varied from *five* to *seven* per cent., exclusive of all still births. But by the agency of scientific sanitary surveillance over the causes of disease and death, the percentage of mortality is now kept below three per cent.

Among the causes of the excessive mortality in New-York an important place must be assigned to the mode of constructing houses and tenements; the crowding of the population in particular localities, and the peculiar neglect of cleanliness in those localities that are most crowded. Such causes of insalubrity have come under the direction of municipal and state governments in some other countries, to a greater extent than in our own; and that accounts for the lower percentage of mortality among certain classes of inhabitants in some other cities. We would particularly refer to the statistics of sickness and mortality in London, Nottingham, Liverpool and Berlin. Without instituting an exact per cent. estimate of average life and mortality, or attempting a nice balance between the various conditions that affect life and health in our city and in the different cities of our own country, and the cities of the old world; weighing all those conditions with as much justness and correctness as possible, and properly estimating their influence upon health and the rate of mortality, it cannot be denied that the city of New-York presents a far higher rate of mortality than any other city in the civilized world. And yet, the rate of mortality in this city is not absolutely so high as in some other cities in our country. New Orleans has had a vastly higher rate of mortality in certain years; but the causes are obvious, and there are some rapidly growing cities of the west that occasionally have given a very high rate of mortality. The same is true of towns and localities subject to some special malaria. But when we compare the mortality of New-York with the mortality of Boston, we discover that the balance is greatly in favor of Boston. And in Boston the same system of crowding exists that prevails in New-York; they have no greater advantages in respect to drainage and natural ventilation, or in respect to local or endemic sources of disease. And yet in Boston the rate of mortality is some twenty-five per cent. less than in New-York.

If we compare the sanitary condition of New-York with that of Philadelphia, we find that New-York has the advantage of Philadephia in regard to all local or endemic sources of disease, taking the whole city together. New-York is washed on either side by tidal currents, which move with great rapidity, and in channels of great depth. The natural drainage of the city is remarkably perfect. With regard to Philadelphia, those favoring conditions are not as happily supplied by nature. Again, the city of Philadelphia is not in close proximity to the sea, and part of the city is located in a district noted for its malaria. When we compare the city of New-York with the city of Providence, we find that Providence has vastly the advantage in regard to the health of its inhabitants, while it possesses no other natural topographical or physical advantages than those which arise from a more sparsely settled population, and from the residences of its inhabitants in separate or individual dwellings. That is an advantage which all the smaller cities enjoy, and which the city of Philadelphia also possesses. But the rate of mortality in the city of Providence is very nearly 100 per cent. less than the average rate of mortality in New-York. Many of the cities of Great Britain present a population living under circumstances very similar to those which exist in this city, and in none of the large cities of Great Britain is there as high a rate of mortality. The conclusion must be, therefore, that the mortuary records in the city of New-York present results that sadly belie the reputation of Manhattan Island for natural salubrity, and cause this highly favored city to compare unfavorably with most other large cities in respect to public health.

It would be difficult to state just what the average rate of mortality would be in New-York, were those causes of disease which are easily removable, actually abated or withdrawn; but it is safe to conclude from facts that are known respecting the improvement of the public health in cities where such sanitary reforms have been effected, that at least 25 or 30 per cent. of the actual mortality of the city from year to year may, and should be prevented, *because it easily can be prevented.* And were such sanitary improvements effected as we now refer to, in the course of a few years many of the social and moral causes that affect the health of certain large classes of the population, would be so far improved that the mortality would be still further diminished, probably to the extent of securing a total reduction of the rate of mortality fully 40 per cent. below the present rate. That would give us a rate of mortality of about the same average ratio as that of the whole of England, which is a fraction over two per cent. of the whole population,—one in 48 of the population dying annually.

Dr. KANE refers to the effect of light upon health, in language that should be read and remembered. The effect of the protracted absence of sunlight is depicted by him most vividly, and those effects certainly were most unmistakable in the history of his residence in the Arctic regions. The late Sir John Wylie, formerly physician to the Czar of Russia, mentions the interesting fact that

* R. R. Report.

in certain barracks in St. Petersburgh, the difference in the mortality in the apartments of the barracks supplied by sunlight and in those which were shut off from the sun, except by a moderate amount of diffused, reflected light, was 100 per cent.; that is, that the mortality in the darker side of the barracks, that in which direct sunlight never entered, was 100 per cent. greater than in that where the sunlight shone into the windows and doors of the apartments. Similar facts may be observed in the city of New-York; with less definiteness, perhaps, as regards statistics, than in a military establishment, but it is not the less true in the tenement houses of New-York, than in the barracks of St. Petersburgh, that the supply of sunlight in the habitations of the people has been found to bear a very direct relation to the prevalence of diseases that come under the cognizance of physicians; scrofula, ophthalmia, tuberculous diseases, fevers, and all forms of disease arising from low vitality, are to be found in all the tenement houses of New-York in which sunlight is not freely supplied. Under the third head, namely, *the supply of water*, the city of New-York is favored above almost every other city in the world; and were the Croton water supplied in larger quantities, and more equally applied to the wants of the population of the city, it would confer far greater blessings than it now confers. The poor in this city are not all amply supplied with Croton water; too many of our population still beg it from the corner store, or from neighboring hydrants. Again, it is not supplied sufficiently to the sewers and to the securing of the cleanliness of persons, places and streets; but undoubtedly it will be so supplied and applied under the excellent management of that department of the city government that has the control of the Croton water.

The personal causes or agencies affecting health, may be included under the following heads: First, constitutional; second, food and drinks, including, of course, markets and the general supply of food for the people; third, personal cleanliness; fourth, occupation and exercise; fifth, the moral condition of the people as affected by, and relating to all the foregoing conditions; for the moral condition of the people is affected, in a very important sense, by their constitutional proclivities, and their constitutional and general physical conditions and the personal and constitutional peculiarities are affected by their food and drink, by the character of their residences, and by all the physical circumstances and surroundings of the family and the individual. Admitting that we have those natural conditions of the atmosphere which are peculiarly and happily adapted to promote and preserve personal and the public health, we may be grateful for what nature has granted us in that respect—advantages unequalled by any other large commercial city;—the natural temperature; the natural humidity, which bears an important relation to temperature; the natural provisions for the purification of the atmosphere, namely, the proximity of the sea and its broad estuaries that sweep in deep channels on either side of the city; the open space between mountains and hills that compass the Hudson; the open sweep of the westerly, northern and easterly winds directly across the city—those winds that are most purifying, drying and healthy—and the completely unobstructed sweep of the sea breezes directly across the city from the south and east. We possess a climate peculiarly adapted for the promotion and preservation of human health. No malaria floats in our atmosphere excepting such as arises from sunken lots or from imperfect drainage,—sources of disease entirely removable by human agencies. The natural humidity of the atmosphere of the city of New-York is peculiarly adapted to secure us from the occurrence of general epidemics and from pestilential diseases; yet there are certain localities in the city where the humidity of the atmosphere is very much affected by improper local and general drainage in streets and courts, especially in districts near the water sides. All those causes should come directly under the control of the department of the public health of the city. The various manufactories, the use of steam for mechanical and other purposes, so far as it is thrown into the sewers, affects the condition of the atmosphere. The fuel that is used in the city of New-York is not a source of general contamination of the atmosphere, as in most of the cities of the old world; and that goes to the balance in favor of our natural sanitary advantages. In that respect, perhaps, we are on a par with Philadelphia, and have an advantage over Boston, and over many smaller towns. We have much less smoke, and what we have that is offensive, might and should be so disposed of as not to affect human health in this city injuriously; but manufactories and the waste steam that is thrown into sewers, together with the imperfections of our sewerage, and of the local and general drainage of the city, seriously affect the condition of the atmosphere. The immediate vicinity of the residences of the people is of course greatly affected by the character and habits of the residents themselves, and by the number and density of the population. First, local conditions affecting health, external to dwellings and other structures, are very imperfectly supervised and controlled, under the existing sanitary regulations in New-York; and it is our opinion that they never will be properly regulated until there is introduced into some department of the municipal government coordinate with the sanitary bureau, a class of intelligent subordinate officers, thoroughly qualified as *civil engineers*, who shall, when advisable, be under the oversight and direction of the city inspector, and whose duty it shall be to inspect and to exercise a scientific control in all works of drainage, grading and paving.

Skilled sanitary inspection alone appears to be wanting to complete the grand arch of our municipal executive departments. The frame work of a very good system of city government has been erected, and when the public mind becomes enlightened in respect to all the great vital interests of the city, and when a proper public sentiment exists respecting sanitary protection and improvement, all the errors of our past legislation will be corrected. Then, and not till then, will the shame of executive powers, purposely crippled for partizan ends, be taken away. We have laws in abundance, but there is too little faithful execution, partly from erroneous and faulty legislation, but principally from indisposition and lack of intelligence in the executive departments of the government. *Skilled sanitary inspection* and control is required to act as the key-stone to the great arch of municipal departments; that department was designed to search for, to investigate, to report, and to remove *all physical causes of preventable disease*. Every house, every tenement, every manufactory, and all ware-houses and places for storage should be provided with a perfect system of local drainage. The minor drains, or the house and lot drainage, should bear proper relations to the street, or general sewerage; and all these should be properly trapped or secured from the recurrent passage of noxious vapors, and in the vicinity of dwellings and manufactories, should the possibility of such a recurrent flow of noxious vapors be prevented, and especially *within* all dwellings, public buildings and manufactories. These precautions or securities against the poisonous sewer gases are provided for by law, and seldom do we find them properly provided for even in the mansions of the wealthy citizens; much less do we find them in the hotels, boarding houses and manufactories. I mention these causes because they are sources of great danger, most liable to be overlooked, and there is a lack of responsibility, not only in regard to the low tenement houses, but in respect to our best dwellings. Recently, in a dwelling that was purchased at a price of $22,000, such a recurrence of noxious vapors was daily perceived in all the dormitories of the house. Upon examination it was found that there were no sewer or stench traps connected with the drainage of the dwelling. There are multitudes of such cases, especially among the hotels, boarding-houses and crowded tenements. The mysterious and terrible epidemic that visited the National Hotel at Washington was produced by this cause.

The works for drainage in every house, and in every lot, alley, court, and street in the city should be subjected to the inspection of the sanitary department of the municipal government, and every builder and plumber should be licensed by that or some co-ordinate department. We think that such surveillance over the domiciliary and yard drainage in this city will eventually be found necessary for protecting an over crowded and constantly increasing population from a most common and prolific cause of atmospheric contamination, and of epidemic as well as sporadic disease. The noxious effluvia from sewers, drains, and privies, produces perhaps as much disease as any other single cause in cities, and the diseases thus produced are peculiarly obstinate and fatal. In a subsequent article we may, perhaps, refer to the influence of such sources of disease. They are widespread; they exist in all parts of the city, but especially in the crowded districts, in tenement houses, in manufactories, in courts, alleys and the various passages and areas, from whence air is supplied to human habitations in this city. The supply of air in most of our dwelling-houses, as well as in hotels and all classes of residences among us, is generally irregular and very insufficient. This remark applies as well to the most costly mansions and edifices, with certain exceptions, as to the most miserly tenement structures. It applies also, most unfortunately, to many of our large public school edifices, to our churches, and to nearly all our places of public resort. These causes affect human health in the city of New-York to an extent that it may be difficult to estimate, but with a certainty that is fearfully estimated by the physician who attends to family practice or to public eleemosynary service in New-York. The effects are seen in all classes and in all places. They are seen little less fearfully in the wealthiest families than in the poorest; for the places of public resort—the assembly room, the theatre, the concert room, and the church edifice, are alike constructed without reference to the natural rights of every human being to breathe a sufficiency of pure air at all times and in all places. This is a *natural right*, which should be *secured* to every human being, and it is a right which may be secured without infringing upon any personal rights or privileges pertaining to others.

Our public school-rooms, which, in more senses than one are a great credit to the city and State of New-York, are generally over-crowded; too many pupils fill the space occupied, however well that space be ventilated by any arrangements and agencies that can be supplied. But with scarcely an exception, the school-rooms of New York are so imperfectly ventilated that they become places of danger to the tender lungs and delicate frames of children. How far legislation, under a democratic form of government, may be competent to control these evils is yet to be seen; but much can be done, and that which can and may properly be done, should speedily be effected.

The supply of air to those classes of tenements, where the occupant is from necessity compelled to accept that which the proprietor of the house has provided, without the means of removing evils, should come more particularly under the jurisdiction of the department of public health. This may be effected in various ways. First, our tenement houses are generally built in crowded districts, with reference to the strictest economy of area, both as regards the ground occupied and as regards the space of the apartments; and all these apartments are, with a very few exceptions, constructed with a total disregard of the natural requirements of the human frame, as regards both air and light. There are districts in this city which are so overcrowded that there is a lack of strictly pure air for respiration. Such districts should become less populous; but happily those districts are not so numerous as in most other large cities. Our streets are wider, and the selection of places for residence is more favorable than in most other cities, and greater than in the cities of the Old World which have become overcrowded. But there is an over-crowding of particular tenements, wherever situated, which needs regulation. We find, in certain places of the city, upon twenty-five feet of street frontage, long tenement houses built upon the whole length of the lot, and that faced by another tenement, owned perhaps by another proprietor, allowing but a narrow space between the two tenement houses, where, of course, but an imperfect supply of air is enjoyed: much less is there a supply of natural sunlight. Such modes of construction should be so controlled as to prevent the exclusion of sunlight, and so as to secure free ventilation.

We find rear tenement-houses in almost all the districts of the city known as the tenement districts. Those have been very graphically described by the Tenant-House Committee, appointed by the Legislature in 1856, whose report was transmitted to the Legislature a year ago. That report contains many startling details, but it by no means presents a complete view of the subject. There are such a variety of faults in our tenements, for the laboring and poor population of New-York, that it would require almost a volume to describe them, and much more to describe the places and their inhabitants. These are the favorite haunts for all forms of disease that endanger the public health; small-pox and all the eruptive diseases not only are present in the city and always making their places of election in such localities, but whenever an exotic disease becomes epidemic in New-York, it is sure to find in those localities the soil and circumstances most favorable to its development into an epidemic. Such diseases as fevers, erysipelas, and all contagious or infectious maladies, are those that most endanger the health of the community, and they are superinduced by the general contamination of the air. That is very well illustrated in the history of the cholera in 1849. The whole city was equally exposed to cholera, perhaps, if we regard cholera as an exotic disease, as we must; and this tendency of that malady was so marked in 1849, that we could tell beforehand what districts were particularly exposed to that epidemic. The same was the case, too, in the early period of cholera, in 1832; and the same will be the case whenever cholera or any similar epidemic occurs in this city. We thus see the relation which the residences of the laboring and poor population of New-York sustain to the general sanitary interests of the public health, and to the commercial interests of the vast and rapidly increasing population of the city. Hence, we infer the imperative necessity of some legislative measure which shall meet the difficulties and correct the evils we have indicated.—*Sanitary Report.*

CROTON WATER DEPARTMENT.

Several interesting points, in connection with the Croton Board, are at present attracting attention.

The ordinance regulating the construction of vaults in front of stores and dwelling-houses limits them to the outer edge of the sidewalk, except by special permission from the Croton Department, and this on payment of a specified fee for the permission. Of late, however, and especially since the mania for marble stores and broad vaults has seized the merchants of New-York, the owners and builders have gradually encroached upon the streets, or rather the *substratum* of the streets, until, in one case at least, the walls of the vaults on either side of the street approach within four feet of each other. This may seem, to the casual reader, very unimportant, but when it is taken into consideration that sewers, gas pipes and water pipes must be laid or repaired, it will be readily seen how much wrong may be done by this encroachment upon the underground rights of the city. In one case—we do not chose to name the street, lest some of the Insurance Companies might demand a cancellation of their policies—the vaults are so far extended beneath the street, that it was found impossible to place a fire-hydrant at the point designated; and in another case, a party now about erecting a marble store, had the conscience to ask permission to build a vault twenty-nine feet wide, which is exactly half the width of the street. There is now more than one street running across Broadway, and below Reade street, where, if any accident should happen to the gas or Croton pipes, immense damage might be caused by reason of the vault mania. The subject has attracted the attention of the Croton Board, who had a meeting with special reference to it yesterday; and on the representation of Mr. Craven, the Chief-Engineer, whose twelve years' experience in that office qualify him to judge, they decided to grant no more permissions for vaults beyond the limits restricted by the ordinances, which were *two fifths* of the street, measuring from house to house; but by the tenor of the rule now adopted by the Board, no vault will be allowed to be constructed beyond the limits of the curb-stone. There is, however, one singular exception to this rule now existing—a large manufacturing firm, which owns property on both sides of the street, had constructed vaults extending from side to side, and last year, when a sewer was to be made in the street, they offered, at their own expense, to connect the sewer, at either end of their vault, by iron pipes sufficiently large to carry off the drainage which would pass through the sewer. This was permitted for the

double reason that the sewer would disfigure their vaults, and that the nature of their business demanded secresy in some of its operations, they preferred to meet this expense rather than allow outside parties to examine it. The rule adopted by the Croton Board seems to be just, and to be imperatively demanded by every consideration of expediency.

Another point is the settlement of the question as to who shall be at the expense of supplying water to the convicts incarcerated in the State prison at Sing-Sing. It was generally supposed by residents and tax-payers of the city of New-York, when they assumed a debt of some thirteen millions of dollars (since grown into twenty) for the introduction of the Croton water, that it was intended for their own exclusive use, on payment of a fair and proper equivalent. It appears, however, that the State of New York lays claim to the right of using it, and this claim is to be established by the legislation now in progress at Albany. By an agreement between the State Prison Inspectors and the Croton Board in 1846, the Board agreed to supply the prison at Sing-Sing thirty thousand gallons a day for ten years, at $750 per year for the first five years, and $1,250 per year for the balance of the term, which expired in 1857; and this was deemed as an equivalent for the land owned by the State through which the aqueduct passes. In 1858, a law was passed allowing to the Croton Board $1,240 per year for such quantity of water as might be required for the use of the prison, and this is less than one-half the charge made to consumers in the city. The Board, as a matter of course, protested against such a measure, but it was adopted notwithstanding. The Board then sent in bills for the water actually used, during the year 1857, '58 and '59, (as ascertained by measurement,) amounting to $11,-592 45, and demanded payment at the hands of the State officials. Instead of settling this account, the State Prison Inspectors have caused a bill to be introduced into the Legislature which refers the matter to three commissioners, yet to be appointed, who are to decide upon the amount which the prison ought hereafter to pay for the use of the water for such purposes as may be needed. This gives the power virtually to the State officials to use as much of the Croton as they choose, and to pay what they deem proper, so that if they should determine upon the necessity of laying a thirty-six inch pipe from the Aqueduct to the prison they could do so, and cut off more than half the supply from the city; and once the State lays its grasp upon the Aqueduct, every village between the Dam and the High-Bridge will discover a necessity for the Croton, and obtain it through the Legislature.

The agreement made in 1846 was based on the ground that the State permitted the Aqueduct to be constructed through the Prison Farm without charge, And now, because the Board claim payment at twenty-five per cent. less than is paid by any householder in New York, the State steps in and intends to claim the right to use as much water as its officials choose, paying for it at their own prices, and leaving the Croton Board powerless. The act referred to, if passed, will enable the State Prison Inspectors to use without stint, and at their own price, the water for which the city of New-York has incurred a debt of nearly twenty millions of dollars.

The Croton Board, mindful of the interests of the city, has prepared a counter bill which will be forthwith presented, and which, if there be any sense of honor or honesty in the Legislature, should be promptly passed. Its provisions are, first, that the State shall pay the sum of $11,592 45, now honestly due for water used during the years 1857, '58 and '59; and second, that the Comptroller shall establish, in conjunction with the Croton Aqueduct Board, a just and equitable mode of ascertaining the quantity of water which may be used during every year in which the prison is furnished with Croton water; and for the quantity which it is found may be used, shall pay at the rate of three-quarters of one cent for every one hundred gallons.

WATER SUPPLY OF PARIS.

There is no doubt but that, among the great improvements now in progress under Imperial direction, the supply of gas and of water in Paris will be increased.

The city is at present supplied with water from various sources. The maintenance of the water-works and the expense of distributing the water are paid by the municipality. The sources whence the supply is brought are —firstly, from the Canal d'Ourcque, by gravitation, which is 52 mètres above the level of the sea, and about 20 mètres above the lowest point of Paris; secondly from the river Seine, whence it is pumped by steam-engines, and raised to the varied hight of 75·30, 72, and 66·24 metres above the sea, and to 43·30, 40, and 21·24 mètres above the lowest levels of Paris; thirdly, from the artesian well of Grenelle, the basin of which is 90 mètres above the level of the sea; fourthly, from the aqueduct of Arcueil, the reservoir of which is 57·39 mètres above level of the sea; and, fifthly from sources to the north, which are at much greater elevation, but which, in respect of quantity, furnish but little water. The water d'Ourcque is distributed to all the low or less elevated quarters of the city, or to about two-thirds of the entire surface of the town; the others supply the higher districts. The total length of the principal conduits is 218,213 mètres; the length of the smaller pipeage extends to 190,048, or to a total of 408,254 lineal mètres, or about 253·6 English miles The length of the conduits of the water d'Ourcque extends to 281,525 mètres, while all the others are only 126,729 meters. The whole length of the streets of Paris is about 400,000 mètres, which is less than the extent of the pipeage; but there are many streets without water, while there are several with a double pipeage. It would require about 30,000 mètres of small pipeage to give water to all the streets of the capital. The daily quantity that can at present be sent into Paris is as follows :—

Water d'Ourcque . .	102,000	mètres cube.
" from Seine . .	30,000	"
" from Grenelle . .	950	"
" from Arcueil . .	700	"
" from northern sources	200	"
	133.850	"

or about 29,417,000 gallons.

The total quantity distributed varies considerably. During the hot weather of last year the consumpt rose to about 120,000 mètres cube—viz., from l'Ourcque about 100,000 mètres cube, and from other sources 20,000 mètres cube. In winter the consumpt diminished much, but never below 70,000 mètres cube. The number of houses within the boundaries of the water supply of Paris amount to upwards of 30,000, of which only 9936 were, in December, 1857, supplied with pipes, showing that scarcely a third of these receive water directly. The population amounts to 1,093,262, and the number of the houses directly supplied with water being only a third of the whole, it follows that not more than 351,081 persons are enjoying the advantages of water within their houses. Assuming that 120,000 mètres cube, or 26,350,000 gallons, are sent daily into Paris, and that the population amounts to about 1,100,000, it shows that there is a daily supply afforded of about 24 gallons to each individual inhabitant. The quantity, however, actually used for domestic purposes is, comparatively speaking, small. It has been calculated that the average daily quantity furnished to each house into which pipes are introduced into the court is about 1444 litres, or very nearly ten gallons for each inhabitant in such houses. But the average quantity of water furnished to the whole city (one-fifth of the surface of which is above the level of the distributing reservoirs of the several sources) amounts only to 750 litres per day to each house, or to 5½ gallons per individual. It appears, in fact, that between the *fontaines monumentales* and the purposes of trade and police, about three-fourths of the volume of water is consumed, and that little more than one-fourth is used for domestic purposes. It may be here remarked that the inhabitants of the French capital have not yet made use of water as an agent for carrying off the impurities of their houses into the sewers which debouch in the river, and consequently the Seine has not yet become, like the Thames, a great *cloaca maxima*, but is still pure—an ornament, and not a nuisance, to the city. The peculiar character of the present sewerage of Paris is, that nothing but the rain and waste-water of fountains, or other uncontaminated water, go directly to the Seine, the soil, &c., of houses being run into tanks attached to each building, which are cleaned out at certain times, and carried away to La Valette, beyond the bounds of the city.

It may be supposed strange that in such a city as Paris, where there is water in almost every leading street, and where it is given at a very low price to all who wish it, there should be so few proprietors who take it in. The explanation, however, is very simple, and arises from the two following causes :—First, the rich population continue, as formerly, to take the water for domestic purposes from the carriers of water, drawn from fountains, in which the water of the Seine is carefully filtered, and absolutely refuse to drink the water of the Ourcque canal; while, secondly, the poor population avails itself of the 2000 *bornes fontaines*, or pipes opening in the streets close to the kerb-stone, and of the 69 public fountains scattered throughout the city, whence any quantity of water required may be drawn, free of any cost. It appears that the market fountains, the State and the municipal establishments consume about 13,000 mètres cube; the remainder, or 77,000 mètres cube, is expended on the streets and roads, through the *bornes fontaines* and the 69 drawing and the 33 monumental fountains, and, in fine, on the Bois de Boulogne, where there is alone not less than 16,000 mètres cube expended. In throwing so large a volume of water along the public thoroughfares, and in permitting the drawing of supplies from so many openings, the municipality has not succeeded in the end which they proposed to attain. If these public openings were suppressed, the proprietors of houses would each and all be forced to become recipients of water from the city, enabling their tenants thereby to draw water in the courts instead of seeking it in the street, while the street would be freed from two running gutters which line each of the foot pavements. Up to this moment all the water introduced into houses is drawn from stop-cocks placed in the courts, the proprietors having obstinately refused to distribute it throughout the interior of their property, fearing, as they say, accidents which might arise from the negligence of their tenants. What the present cost of the water supply of Paris has been it is difficult to say. Certain of the works have existed for 250 years, while the Canal d'Ourcque, which affords the greatest supply, was formed for navigation purposes, for which it is still chiefly used. According to the valuation of M. Belgrand, the chief engineer of the present and projected works, we may assume the cost of the existing works at about 20,000,000 francs, or £800,000 sterling; and, taking the daily quantity of water that is sent into Paris to be 26,350,000 gallons, it follows that for every £1 expended there is provided a daily supply of about 33 gallons. To meet the interest of this cost and annual expenditure there is no special tax or forced rate, proprietors being free to take or not, as they please, the water of the city; but those who take it into their houses pay a very small annual charge. The gross receipts for water paid annually to the municipality in 1857 was only 1,276,550 francs, while there was received from the fountains where the filtered water of the Seine is sold 390,499 francs, or a total of 1,666,950 francs, or £66,680 sterling.

Such is the present state of the water supply of Paris; but it is now resolved to alter the whole system, and to bring in a purer and greater supply from the sources of the *Somme-Soude* by gravitation. Considering that the water is to be brought by aqueducts and conduits from a point between Epernay and Châlons-sur-Marne, in Champagne, a distance of nearly 124 miles, it will not be denied that the project was a bold one, and can only be attained at a vast cost; but under the present energetic Government nothing seems too mighty to be accomplished. The point of departure at the source is 104 mètres above the level of the sea, the point of arrival at Paris being 83·50 mètres. The size of the circular conduit will be 2 mètres in diameter, the length 200 kilomètres, and the fall 0·10 mètres per kilomètre. The water, to the extent of about 20,000,000 of gallons per day, on approaching the capital, will flow into the reservoir of Belleville, situated about 200 meters beyond the barrier of Panton. This reservoir will fill two others, that of Montrouge, situated on the south side of the city, at 80 mètres above the level of the sea, and also beyond the barrier, and that of Passy, which is situated on the north-west of the city, at 75 mètres above the level of the sea. These three reservoirs will contain together 240,000 cubic mètres of water (about 53,000,000 gallons), or about 2½ days' supply. The cost of each reservoir will average 1,600,000 francs. The main and small pipeage will be placed in open tunnels for sewerage, where these exist, and where they do not, they will be laid in the ground. The most elevated portions of Paris, but which occupy a small extent of the city, are 60 to 64 mètres above the level of the sea; the hight, however, of the chief portion does not exceed 40 mètres, while the greatest hight of the houses is 17·50 mètres. The water will consequently easily reach the higher flats of the greater part of Paris, and the lower flat of every house even in its most elevated parts. The contemplated cost of the undertaking, including the expense of the acqueduct, collecting the water, the indemnity to landowners, and works, is estimated by the engineer at 26,000,000 francs; but the grand council of roads and bridges have put down the expense at 30,000,000, to which the expense of distributing reservoirs and mains, amounting to 17,000,000 must be added, making the whole contemplated cost 47,000,000 francs, or £1,880,000 sterling. It is proposed that the present pipeage, which is in a very perfect state, should be made use of, and that the water from the Canal d'Ourcque should be reserved for public purposes, but not distributed in greater quantities than at present. It is also proposed that, in order to make use of the 100,000 mètres cube easily obtained from this source, additional sewers should be constructed throughout Paris, the half of the streets being only at present furnished with these, which will create an additional expense of 43,000,000 francs, or a total cost of 90,000,000 francs—or £3 600,000 sterling—for the complete sanitary improvement of Paris. The question necessarily arises, how the interest of this large outlay is to be met, and the answer is, by a rate from those taking the water. This it is apparent, will be considerable, for if we add to the 9936 proprietors who already pay the rates paid by public establishments, it will be found that the total number of those taking water from the city is 10,115, which produces, as already stated, 1,276,550 francs; and if these receipts be added to the tariff of the water of the Seine, which is very moderate, they will produce at least 2,300,000 francs, which shows the average sum for each rate-payer to be 227 francs, or say 230 francs; and if the 30,000 houses of Paris take the water at this price, the total gross receipts will be 6,900,000 francs, and, deducting therefrom the present receipt of 1,700,000 francs, shows a receipt for the new supply of 5,200,000 francs, which represents about 11 per cent. on the capital (47,000,000) employed. It is very probable that every house in Paris will take the new water at a price even higher than that of the filtered water of the Seine. Indeed, the rich population will no longer have any objection to urge against the new supply, which will be distributed fresh and clear, and which will be even more agreeable to drink than the filtered water of the Seine. The proprietors also of workmen's houses will be induced to take the water in consequence of—first, the proposed gradual suppression of all the public fountains, which form a real obstacle to the circulation of the city; secondly, by removing the side-cocks on the streets and placing them under the pavements, where the drawing of water would be impracticable for domestic purposes, and which would likewise be more convenient for pedestrians; and thirdly, by permitting all the ratepayers the liberty of running their soiled water into the public sewers, which is now collected in tanks attached to each house, and which are emptied at a cost of 8 francs per cube mètre. The liberty of doing so should, however, only be granted when the proposed great lineal sewers on each side of the Seine are formed to carry off the sewerage of the capital to the country, and which will maintain, as heretofore, the purity and salubrity of the Seine.

As yet Paris, as we have seen, is not permitted to make use of the easy agency of water to carry off its impurities into an adjacent river, and which has proved such a nuisance and growing difficulty to other large towns; and it is to be hoped, for the best interests of that beautiful capital, that every precaution may be taken, when a more abundant supply tends to induce such a use, to prevent an evil similar to that now experienced in many of the British cities.

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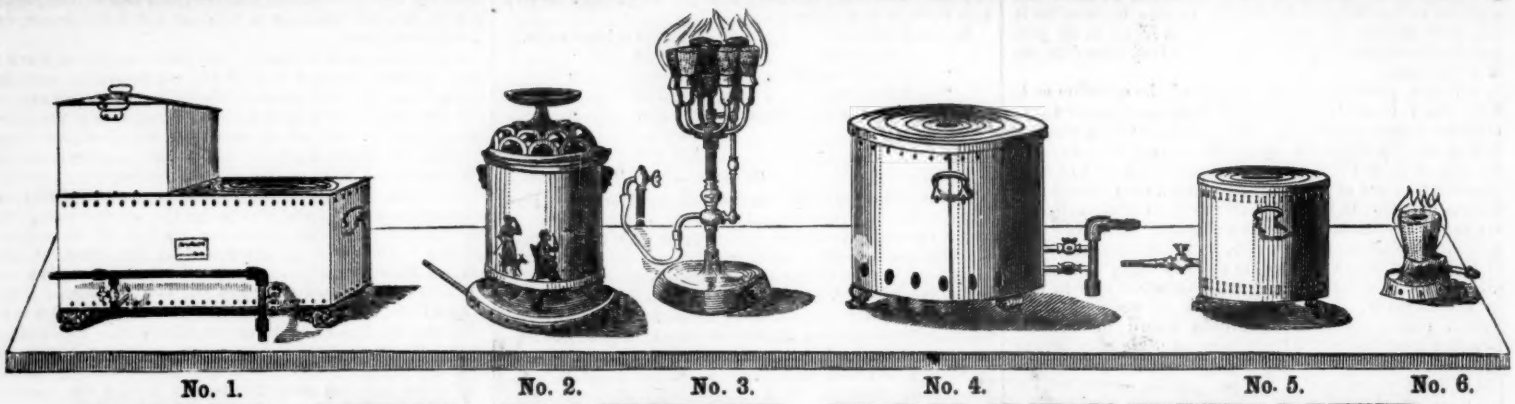

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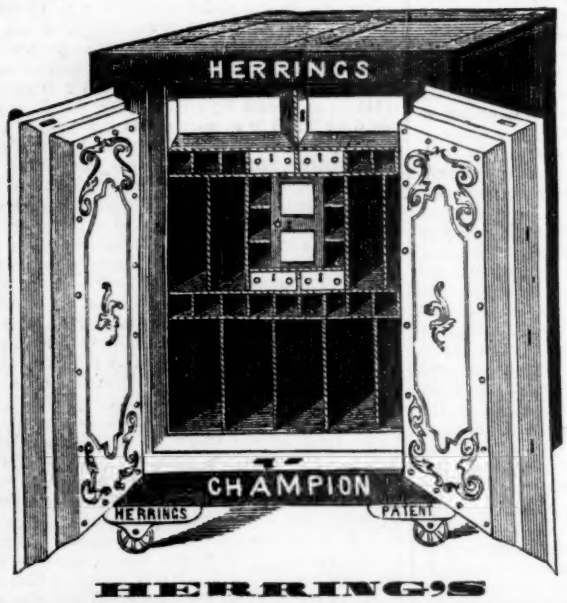

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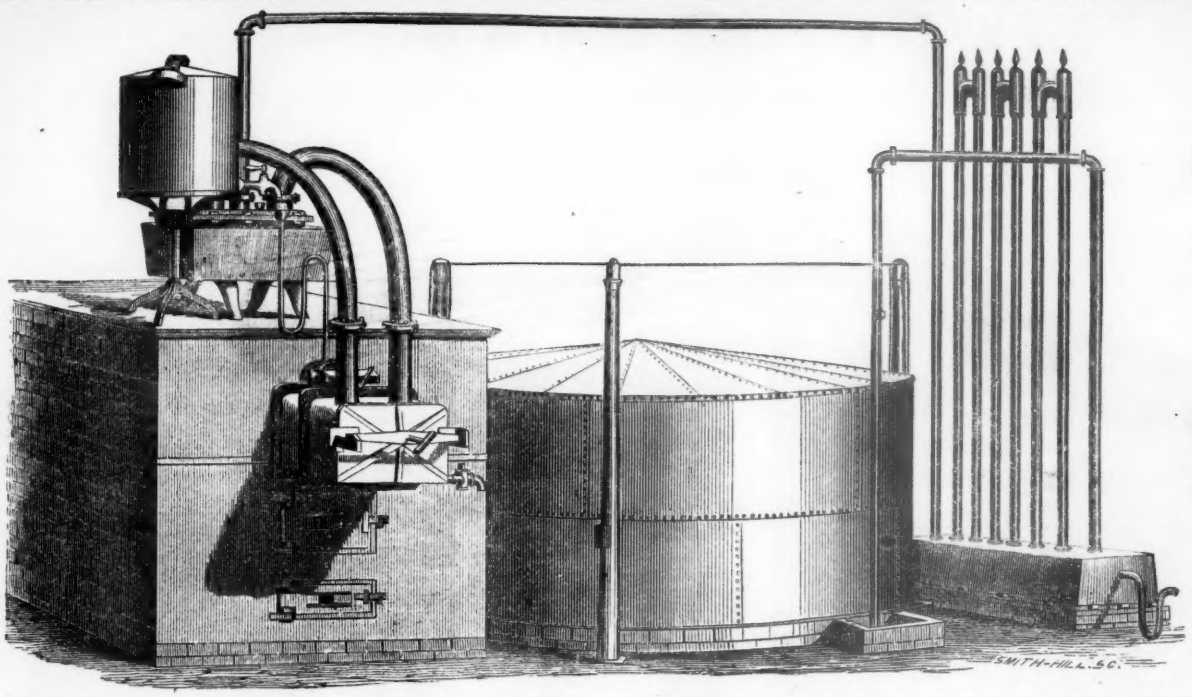

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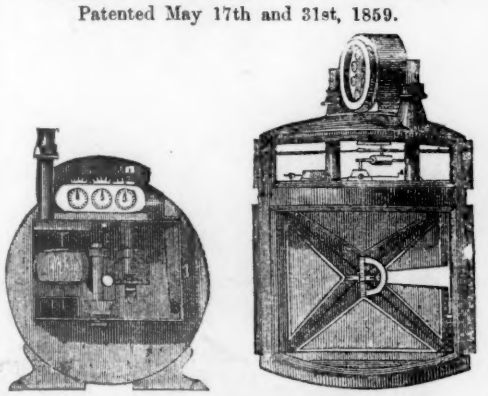

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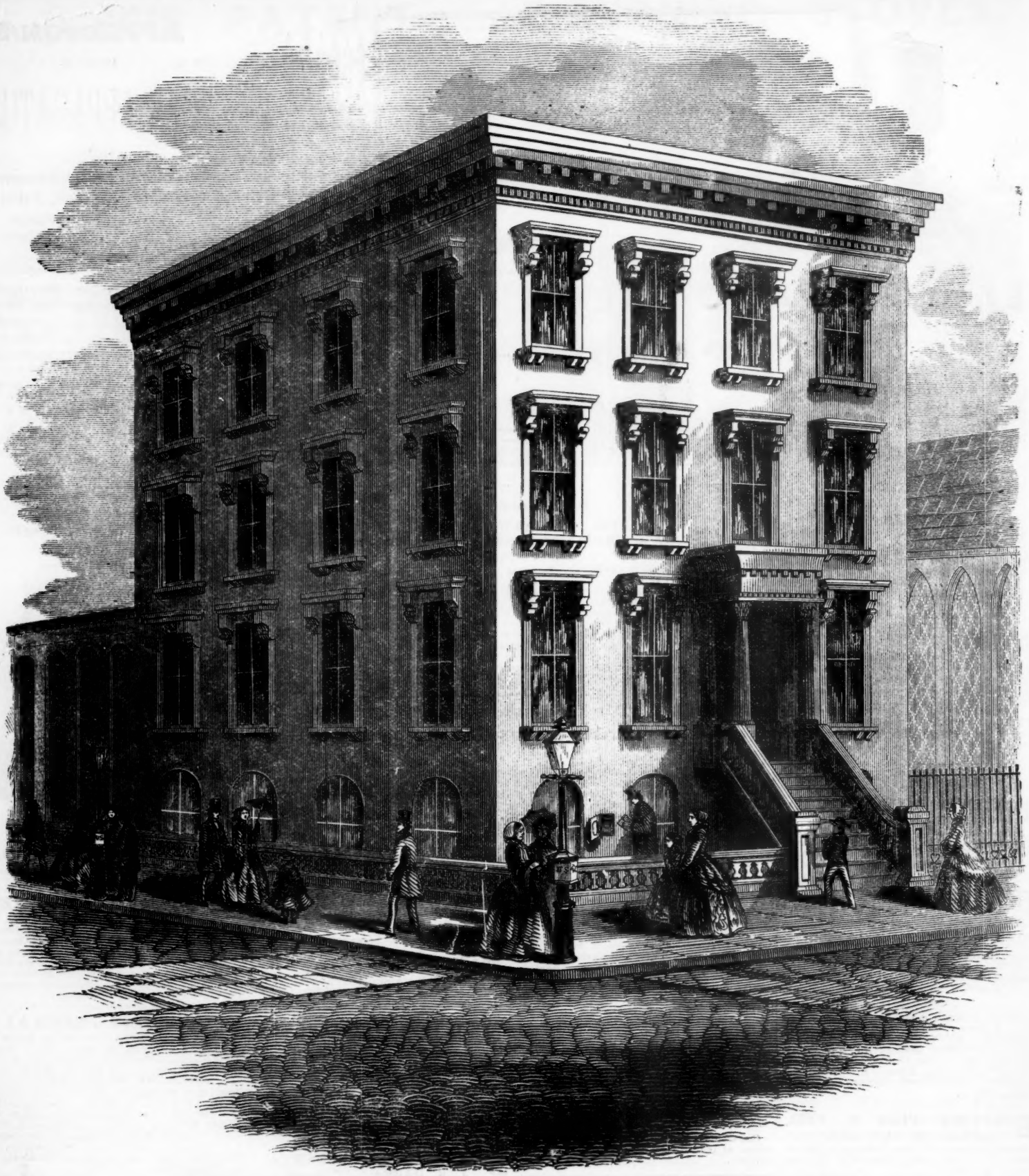

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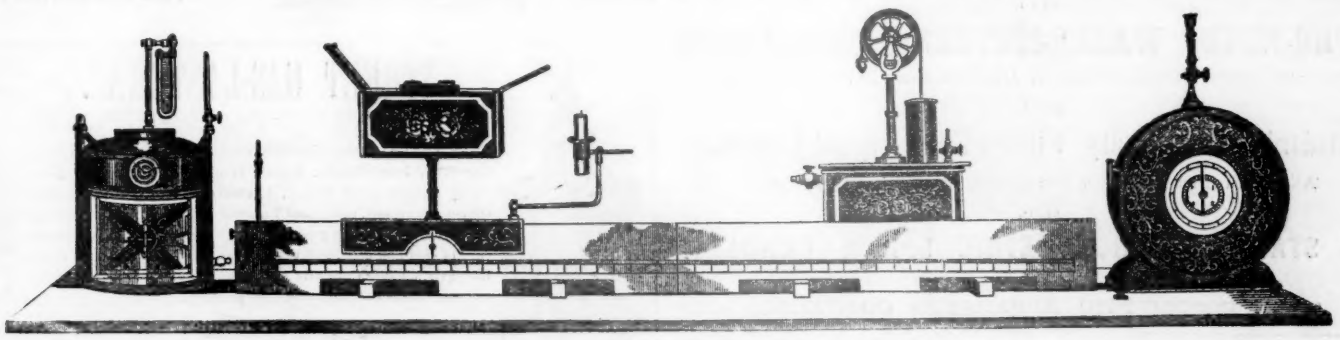

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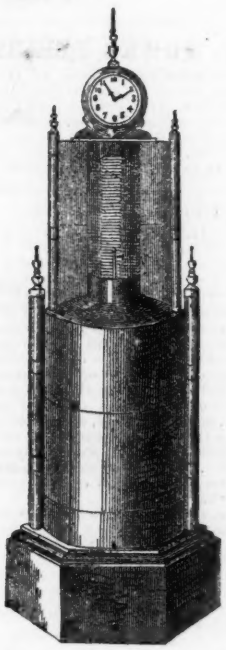

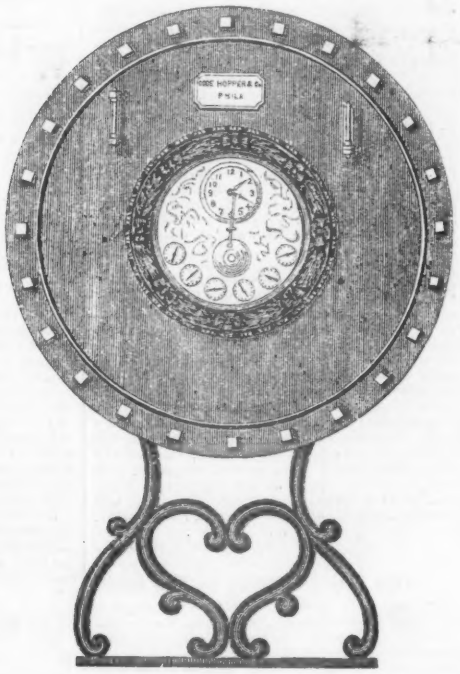

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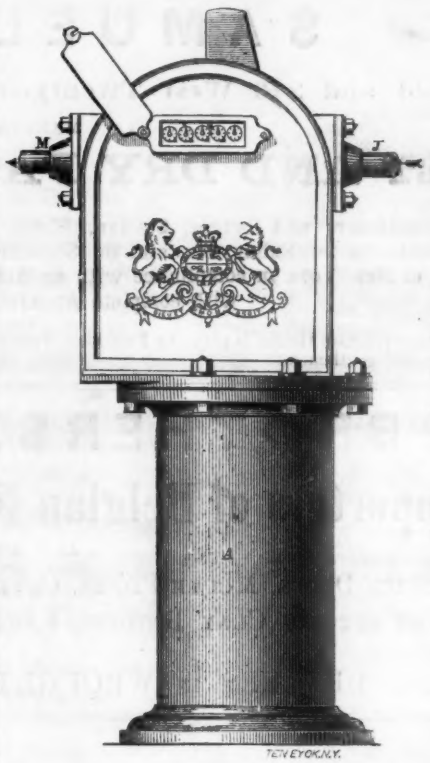

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WATER-WORKS DEPARTMENT—Commercial Bank of New Orleans.—DIVIDEND NOTICE.—This institution has declared a dividend of Five Dollars per Share, payable to the shareholders registered in New York, on the 15th of April next, by

R. W. MONTGOMERY,
56 Exchange Place, New York.

OFFICIAL.

CITY OF NEW YORK,
Department of Finance,
Comptroller's Office, March 22, 1860.

PROPOSALS FOR $228,900 Water Stock of the City of New York.

Sealed Proposals will be received at the Comptroller's Office until Saturday, April 21, 1860, at 2 o'clock, P. M., when the same will be publicly opened, for the whole or any part of the amount of Two Hundred and Twenty-eight Thousand Nine Hundred Dollars of The Water Stock of the City of New York, of the year 1854, authorized by chapter 342 of the Laws of 1854, and by an ordinance of the Common Council, approved by the Mayor, November 1, 1859, for purchasing Lands, constructing a new Reservoir, and extending the Croton Water-Works.

The said stock will consist of two thousand two hundred and eighty-nine shares, of one hundred dollars each, and bear interest at the rate of six per cent. per annum, payable quarter-yearly from the Sinking Fund for payment of Interest on the City Debt, and the principal redeemable on the first day of October, 1875, from the Sinking Fund for the Redemption of the City Debt.

The proposals will state the amount of stock desired, and the price per share, and the persons whose proposals are accepted will be required to deposit with the chamberlain of the city, within ten days after the opening of the bids, the sum awarded them respectively, including the premium on the same.

On presenting the receipts of the Chamberlain to the Comptroller, bidders will be entitled to receive certificates for equal amounts of the par value of the stock, bearing interest from the dates of payments.

Each proposition should be sealed and endorsed "Proposals for Water Stock," and the proposals thus sealed and endorsed put in a second envelope, addressed to the Comptroller.

The right is reserved to reject any or all of the bids, if considered necessary to protect or promote the interests of the city.

ROBT. T. HAWS, Comptroller.

BRADBURY M. JOHNSON, GAS-Fitter and Plumber, No. 111 East Eighteenth street, New York:

A large and elegant assortment of CHANDELIERS, BRACKETS, &c. Gas-Pipe and Posts made for Gas Companies on favorable terms.

FREEZING OF GAS-PIPES.—Walton's Patent Anti-Freezing Apparatus illustrated by engravings, in the AMERICAN GAS-LIGHT JOURNAL, of January, 1860, page 141, is the most simple, durable and efficient of any known process.

According to Professor Faraday, the watery vapor contained in illuminating gas amounts to 0·0093 parts where the gas is at a temperature of 40°, or in other words, that there are 1, 7-10 *gills water in every* 1,000 *cubic feet of gas* at that temperature. It is the deposit of this water in the form of frost that closes the exposed pipes.

Walton's plan is, in a few words, to supply this water with a sufficient quantity of alcohol (98–100ths), the vapor of which will enable it to pass through the most exposed pipes, unaffected by frost. Experiments of three years prove that one gill of such alcohol will protect 1,000 feet of gas at any temperature. Private houses, Hotels and Gas-works, can be thus guarantied from frost by the use of Walton's Anti-Freezer, which consists of but two or three small castings, at the most trifling cost. It can be applied at Gas-works without altering any of the pipes; and the expense of labor and the alcohol will not exceed two cents per 1,000 feet of gas.

It can be seen in operation at the rooms of the AMERICAN GAS-LIGHT JOURNAL, Iron Buildings, No. 254 Canal street East, near Broadway, New York city, where orders will be executed at once.

Certificates from Gas-works where Walton's Patent has been in operation, will be exhibited.

Read the Following Testimonial:

GAS-WORKS, CINCINNATI, O.,
24th May, 1858.

MR. JOHN WALTON,
Louisville, Ky.:

DEAR SIR,—At an earlier date, I intended to have written you the result of my experience during last winter, in regard to your patented apparatus to prevent the freezing of gas in pipes. I am quite convinced that both in theory and practice your apparatus is correct, and in no case will it fail to prevent the freezing in pipes of our illuminating carburretted hydrogen gas, provided attention is paid to renew the alcohol often enough in proportion to the amount of gas passing through the anti-freezing apparatus.

Yours truly, JOHN JEFFREY.

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